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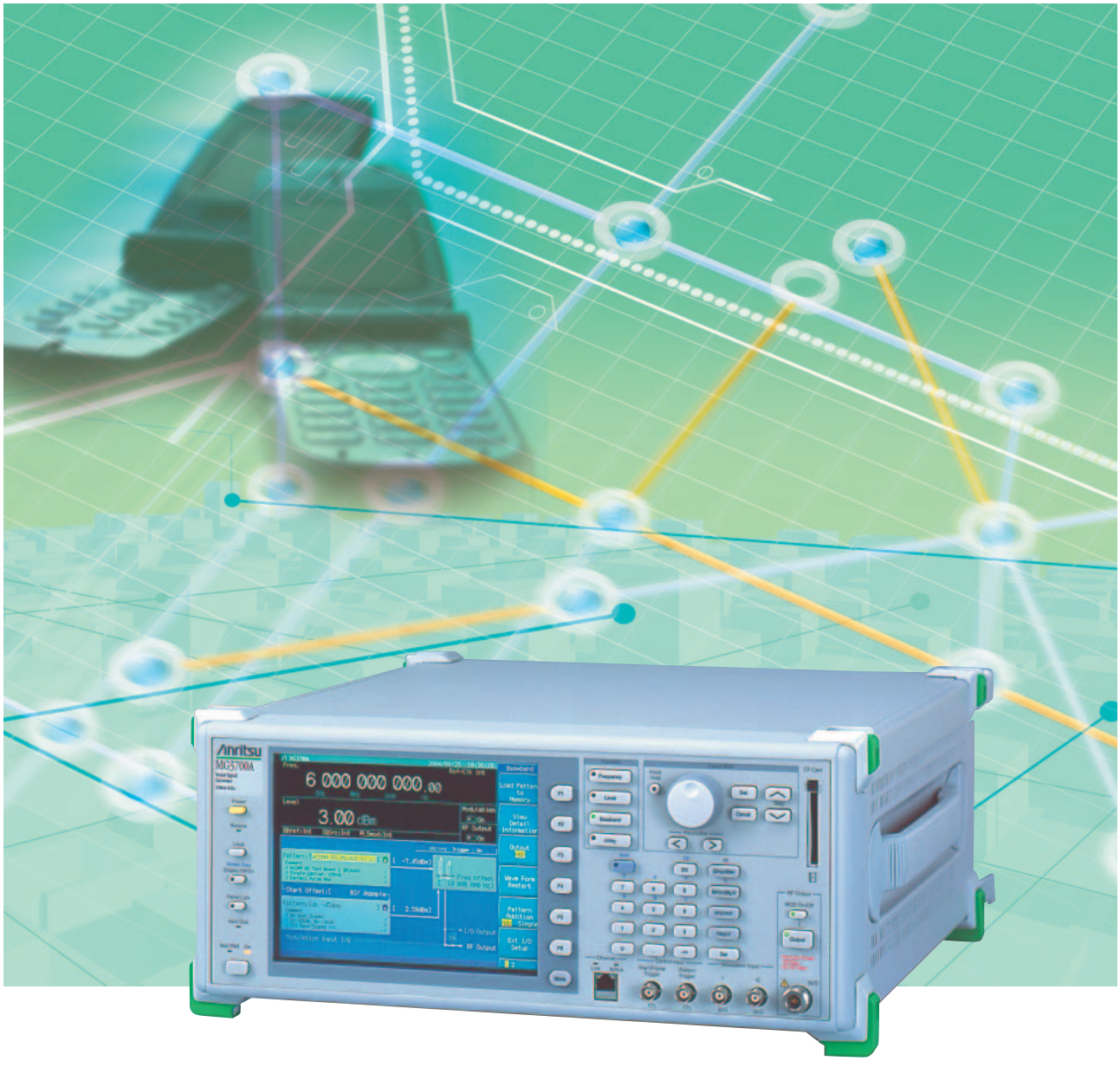
Anritsu

MG3700A Vector Signal Generator

MX370x series software

MX3700xxA Waveform pattern

MX3701xxA IQproducer



Superior Expandability Supporting A Wide Variety Of Communication Systems

MX370x series software

The MG3700A Vector Signal Generator (hereafter referred to as "MG3700A") is a signal generator that integrates a 160-MHz high-speed ARB baseband generator. With features that include a broadband vector modulation bandwidth and large-capacity ARB memory, it supports digital modulation signals for a variety of communication systems. The MG3700A provides optimal performance for generating signals for new wireless communications in advancing broadband technology, as well as for major mobile telecommunication systems such as mobile phones and wireless LANs.

Since the standard MG3700A comes equipped with an ARB generator, modulation signals can be output simply by selecting a waveform pattern that conforms to each supported communication system. The following four categories of waveform patterns are available for the MG3700A:

- **Standard waveform patterns**
- **Waveform patterns generated by the optional waveform pattern option (Model: MX3700xxA)**
- **Waveform patterns generated by the optional waveform generation software IQproducer (Model: MX3701xxA)**
- **Waveform patterns converted from data generated by commonly-used signal generation software, so as to be available for the MG3700A.**

Each waveform category above contains multiple waveform pattern files in which parameters conforming to each communication system are set in advance. The default waveform patterns are saved on the MG3700A hard disk, allowing users to make free use of them. In addition, optional waveform patterns are also available.

The waveform generation software IQproducer is provided with the system to support various communication methods. Parameter setting for the waveform data of a corresponding communication system can generate an arbitrary waveform pattern file that can be used by MG3700A.

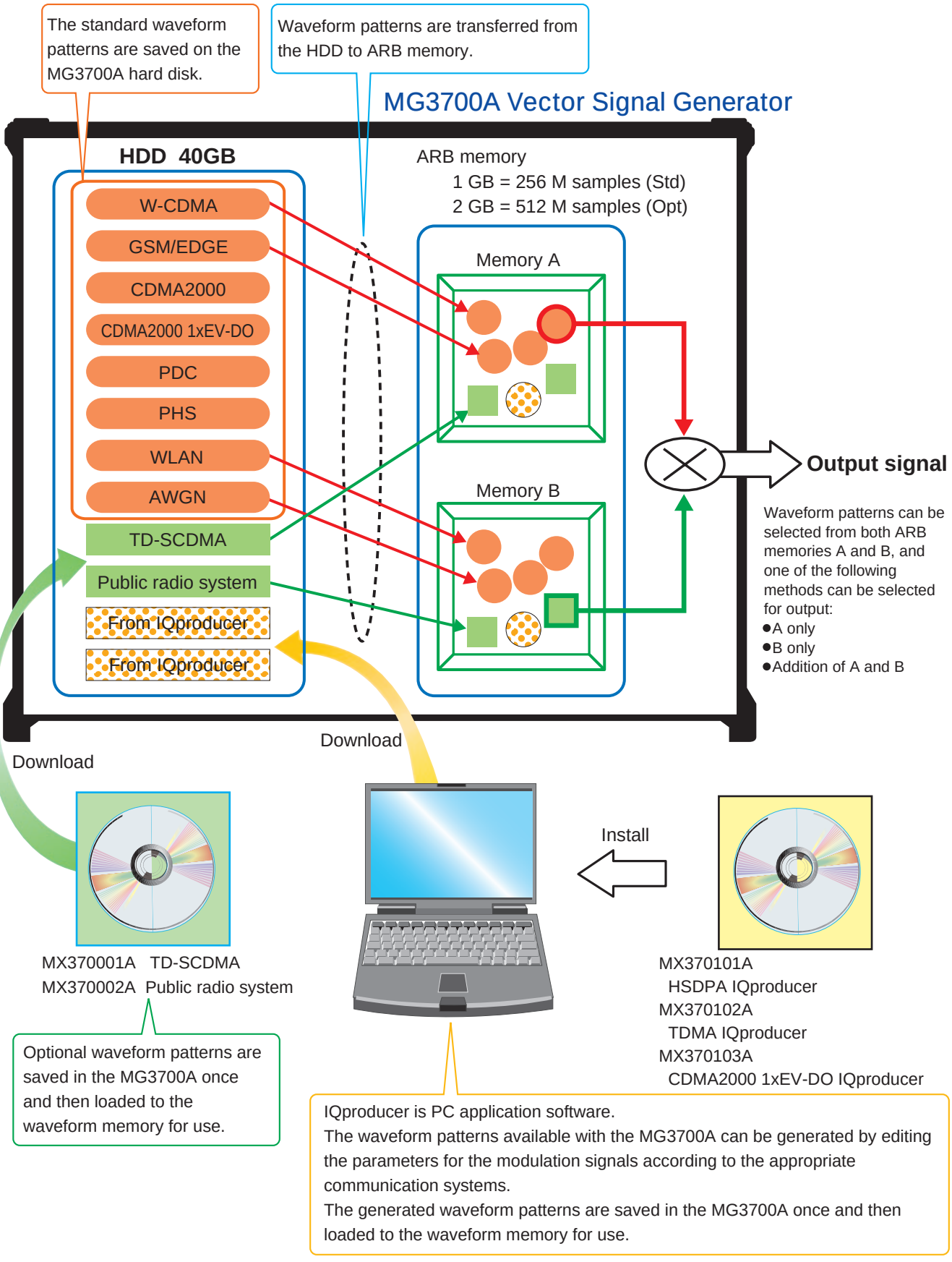
MG3700A can output signals by choosing a waveform pattern when the generated arbitrary waveform pattern file is downloaded to MG3700A via LAN or a CompactFlash (CF) card.

Furthermore, an IQ sample file in ASCII format, generated by common EDA (Electronic Design Automation) software such as MATLAB®, can be converted into a waveform pattern file for MG3700A. Thus, a user can arbitrarily generate a custom waveform pattern file.

Selection guide

Communication system	Page	Waveform pattern			IQproducer		
		Standard	MX370001A TD-SCDMA	MX370002A Public Radio System	MX370101A HSDPA	MX370102A TDMA	MX370103A CDMA2000® 1xEV-DO
W-CDMA	4	✓			✓		
HSDPA	24	✓			✓		
GSM	11	✓					
EDGE	11	✓					
CDMA2000	10	✓					
CDMA2000 1xEV-DO	8, 31	✓					✓
TD-SCDMA	18		✓				
PDC	13, 14, 28	✓				✓	
PHS	12, 28	✓				✓	
WLAN IEEE802.11a	15	✓					
WLAN IEEE802.11b	15	✓					
WLAN IEEE802.11g	15	✓					
RCR STD-39	21			✓			
ARIB STD-T61	21, 28			✓		✓	
ARIB STD-T79	21, 28			✓		✓	
ARIB STD-T86	21, 28			✓		✓	
AWGN	16	✓					

CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).


The standard waveform patterns are saved on the MG3700A hard disk.
Waveform patterns are transferred from the HDD to ARB memory.
MG3700A Vector Signal Generator
HDD 40GB
ARB memory
1 GB = 256 M samples (Std)
2 GB = 512 M samples (Opt)
W-CDMA
GSM/EDGE
CDMA2000
CDMA2000 1xEV-DO
PDC
PHS
WLAN
AWGN
TD-SCDMA
Public radio system
From IQproducer
From IQproducer
Memory A
Memory B
Output signal
Waveform patterns can be selected from both ARB memories A and B, and one of the following methods can be selected for output:
●A only
●B only
●Addition of A and B
Download
Download
Install
MX370001A TD-SCDMA
MX370002A Public radio system
Optional waveform patterns are saved in the MG3700A once and then loaded to the waveform memory for use.
MX370101A
HSDPA IQproducer
MX370102A
TDMA IQproducer
MX370103A
CDMA2000 1xEV-DO IQproducer
IQproducer is PC application software.
The waveform patterns available with the MG3700A can be generated by editing the parameters for the modulation signals according to the appropriate communication systems.
The generated waveform patterns are saved in the MG3700A once and then loaded to the waveform memory for use.

W-CDMA waveform pattern

Standard

W-CDMA waveform pattern:

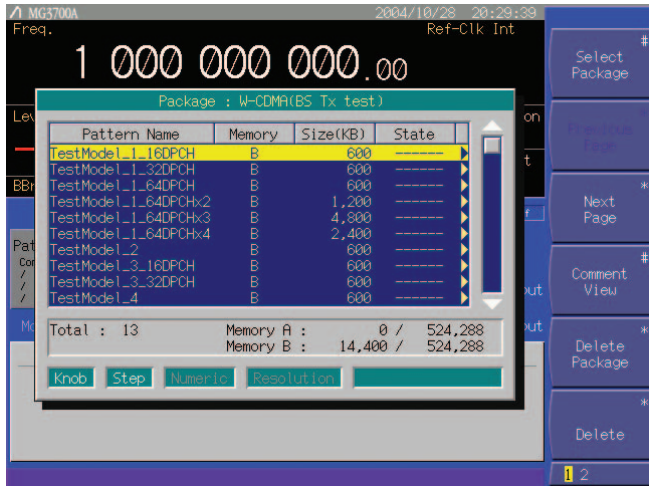
The W-CDMA waveform patterns listed below are provided on the MG3700A internal hard disk as standard (see the next page for details):

- For evaluating transmitter device of BS
  (TS 25.141 Test Model 1 to 4)
  - TestModel_1_16DPCH
  - TestModel_1_32DPCH
  - TestModel_1_64DPCH
  - TestModel_1_64x2_10M
  - TestModel_1_64x2_15M
  - TestModel_2
  - TestModel_3_16DPCH
  - TestModel_3_32DPCH
  - TestModel_4
  - TestModel_5_2HSPDSCH
  - TestModel_5_4HSPDSCH
  - TestModel_5_8HSPDSCH
  - TestModel_1_64DPCHx2
  - TestModel_1_64DPCHx3
  - TestModel_1_64DPCHx4

- For testing receivers and performance of BS and evaluating transmitter devices of UE
  (TS 25.101/ 25.104 UL RMC 12.2 to 384 kbps)
  - UL_RMC_12_2kbps
  - UL_RMC_12_2kbps_ACS
  - UL_RMC_64kbps
  - UL_RMC_144kbps
  - UL_RMC_384kbps
  - UL_AMR_TFCS1
  - UL_AMR_TFCS2
  - UL_AMR_TFCS3
  - UL_ISDN
  - UL_64kbps_Packet
  - UL_Interfere
  - UL_RMC_12_2kbps_TX

- For testing receivers and performance of UE
  (TS 25.101 DL RMC 12.2 to 384 kbps)
  - DL_RMC_12_2kbps_RX
  - DL_RMC_12_2kbps
  - DL_RMC_12_2kbps_MIL
  - DL_RMC_12_2kbps_ACS
  - DL_RMC_64kbps
  - DL_RMC_144kbps
  - DL_RMC_384kbps
  - DL_AMR_TFCS1
  - DL_AMR_TFCS2
  - DL_AMR_TFCS3
  - DL_ISDN
  - DL_384kbps_Packet
  - DL_Interfere
  - P_CCPCH
  - DL_CPICH

Uplink/downlink W-CDMA modulation signals conforming to the 3GPP (FDD) standards can be output simply by selecting a waveform pattern loaded from the MG3700A internal hard disk to the large-capacity ARB memory, without setting any complex 3GPP-compliant parameters.



Example of selecting a waveform pattern

•W-CDMA waveform pattern list

Waveform pattern	UL/DL	Channel	3GPP (Release1999)	Evaluation
UL_RMC_12_2kbps	UL	DPCCH, DPDCH	TS25.104 A.2	BS RX test
UL_RMC_12_2kbps_ACS		DPCCH, DPDCH		
UL_RMC_64kbps *1		DPCCH, DPDCH	TS25.104 A.3	
UL_RMC_144kbps *1		DPCCH, DPDCH	TS25.104 A.4	
UL_RMC_384kbps *1		DPCCH, DPDCH	TS25.104 A.5	
UL_AMR_TFCS1		DPCCH, DPDCH	TS25.944 4.1.2	
UL_AMR_TFCS2		DPCCH, DPDCH		
UL_AMR_TFCS3		DPCCH, DPDCH		
UL_ISDN *1		DPCCH, DPDCH		
UL_64kbps_Packet		DPCCH, DPDCH		
UL_Interfere		DPCCH, DPDCH	TS25.141 I	
UL_RMC_12_2kbps_TX		DPCCH, DPDCH	TS25.101 A.2.1	UE TX device test
P_CCPCH	DL	P_CCPCH	TS25.944 4.1.1*3	UE RX test
DL_RMC_12_2kbps_RX *2		P-CPICH, SCH, PICH, DPCH	TS25.101 A.3.1 TS25.101 C.3.1	
DL_RMC_12_2kbps_ACS		P-CPICH, P-CCPCH, SCH, PICH, DPCH		
DL_RMC_12_2kbps *2		P-CCPCH, SCH, PICH, DPCH, OCNS	TS25.101 A.3.1 TS25.101 C.3.2	
DL_RMC_12_2kbps_MIL *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_RMC_64kbps *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_RMC_144kbps *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_RMC_384kbps *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_AMR_TFCS1 *2		P-CCPCH, SCH, PICH, DPCH, OCNS	TS25.944 4.1.1.3 TS25.101 C.3.2	
DL_AMR_TFCS2 *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_AMR_TFCS3 *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_ISDN *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_384kbps_Packet *2		P-CCPCH, SCH, PICH, DPCH, OCNS		
DL_Interfere		P-CPICH, P-CCPCH, SCH, PICH, DPCH, OCNS	TS25.101 C.4	
DL_CPICH		P-CPICH	—	
TestModel_1_16DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 16 DPCH	TS25.141 6.1.1	BS TX device test
TestModel_1_32DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 32 DPCH		
TestModel_1_64DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		
TestModel_2		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, DPCH		
TestModel_3_16DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 16 DPCH		
TestModel_3_32DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 32 DPCH		
TestModel_4		P-CCPCH, SCH		
TestModel_5_2HSPSDCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 6DPCH, HS-SCCH, 2HS-PDSCH		
TestModel_5_4HSPSDCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 14DPCH, HS-SCCH, 4HS-PDSCH		
TestModel_5_8HSPSDCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 30DPCH, HS-SCCH, 8HS-PDSCH		
TestModel_1_64DPCHx2 *4		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		
TestModel_1_64DPCHx3 *4		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		
TestModel_1_64DPCHx4 *4		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		
TestModel_1_64x2_10M		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		
TestModel_1_64x2_15M		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64 DPCH		

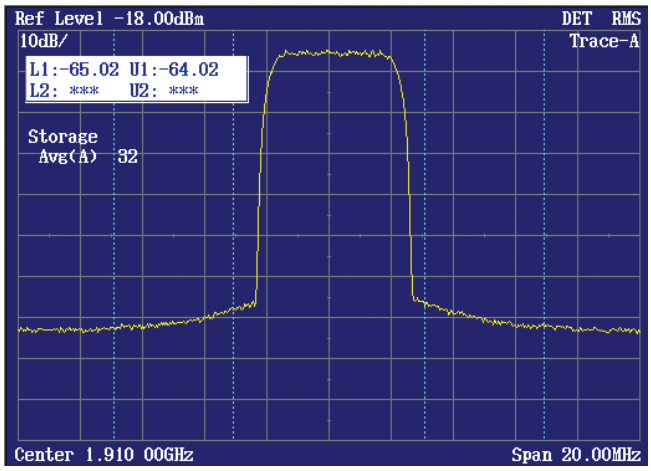
∗1: UL_ISDN can be combined with AWGN that is a standard waveform pattern only when Option 021/121 ARB Memory Upgrade 512M samples is installed.
∗2: P-CCPCH is not included in the waveform patterns such as RMC for UE RX test. They must be used in combination with P-CCPCH waveform patterns.
∗3: 12-bit SFN is added to the head of the BCH transport block.
∗4: x2, x3, and x4 represent the number of multi-carrier signals 2, 3, and 4, respectively.

W-CDMA waveform pattern

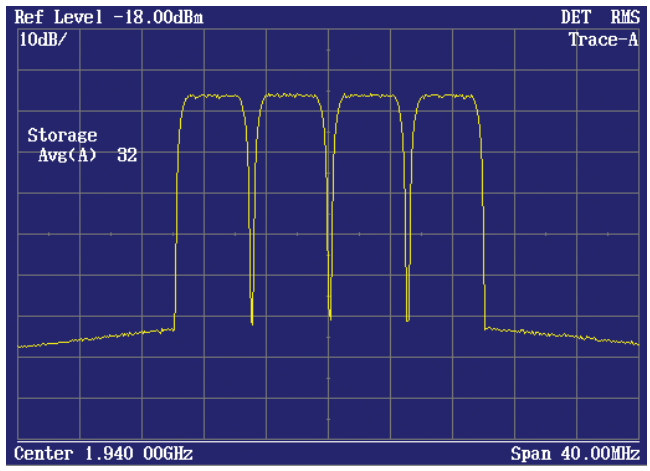
Standard

■ ACPR:

The adjacent channel leakage power ratio of a Vector Signal Generator is an important factor in device distortion testing and receiver interference testing.

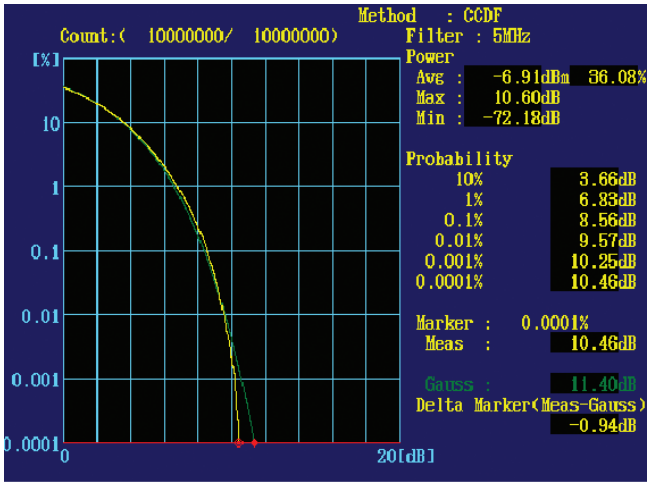


W-CDMA ACPR (Test Model 1, 64 DPCH, 1carrier)
Waveform pattern [Test_Model_1_64DPCH]

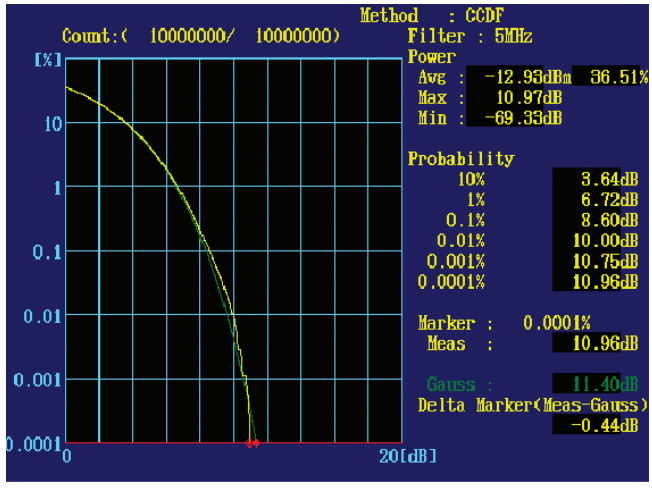


W-CDMA ACPR (Test Model 1, 64 DPCH, 4carrier)
Waveform pattern [Test_Model_1_64DPCH x 4]

■ CCDF:



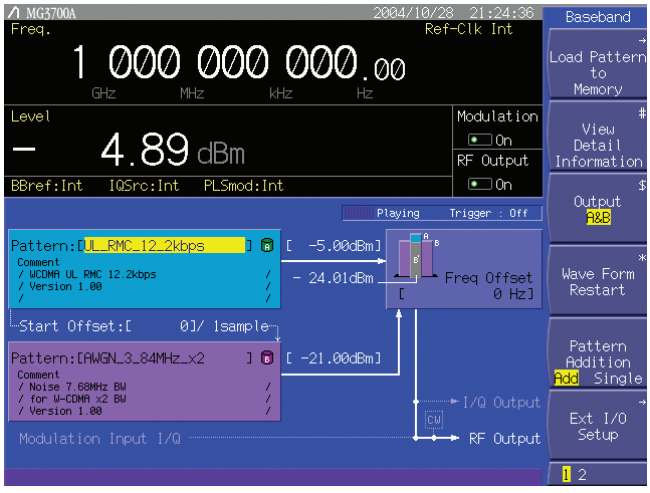
CCDF (Test Model 1, 64 DPCH, 1carrier)
Waveform pattern [Test_Model_1_64DPCH]



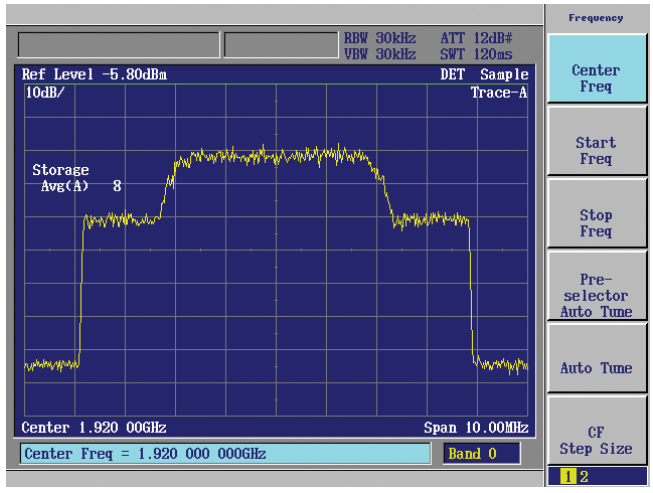
CCDF (Test Model 1, 64 DPCH, 4carrier)
Waveform pattern [Test_Model_1_64DPCH x 4]

AWGN (Additive White Gaussian Noise) Supports Dynamic Range Test

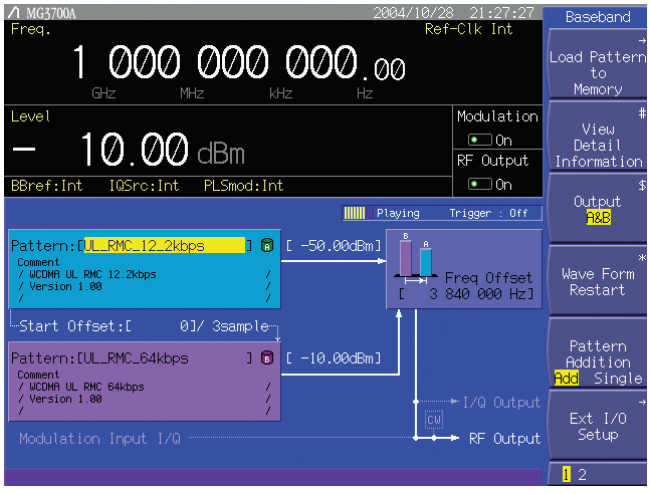
When performing the receiver dynamic range test specified by 3GPP, AWGN with a W-CDMA modulation signal is required.
Either of the AWGN waveform patterns AWGN_3_84MHz_x2 or AWGN_3_84MHz_x1_5, which are stored on the MG3700A internal hard disk, can be used for an AWGN signal.
Since a single MG3700A can add a W-CDMA uplink modulation signal and AWGN signal internally and output them as a combined signal, it is useful for a simple dynamic range test for base station receivers.



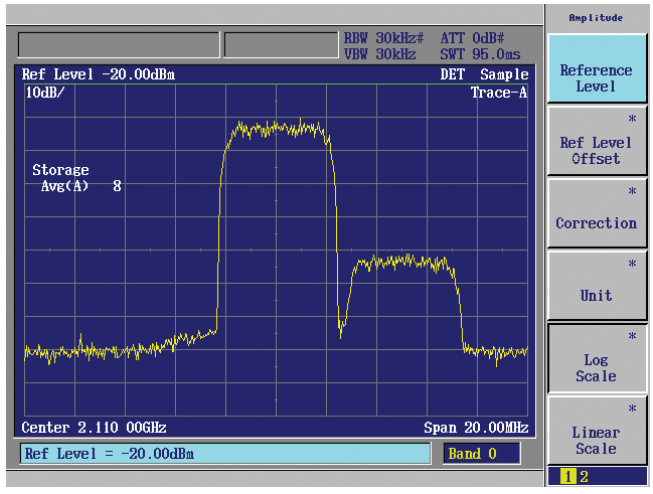
Wanted signal + AWGN screen



Output waveform screen of Wanted signal + AWGN



Wanted signal + Interfering signal screen



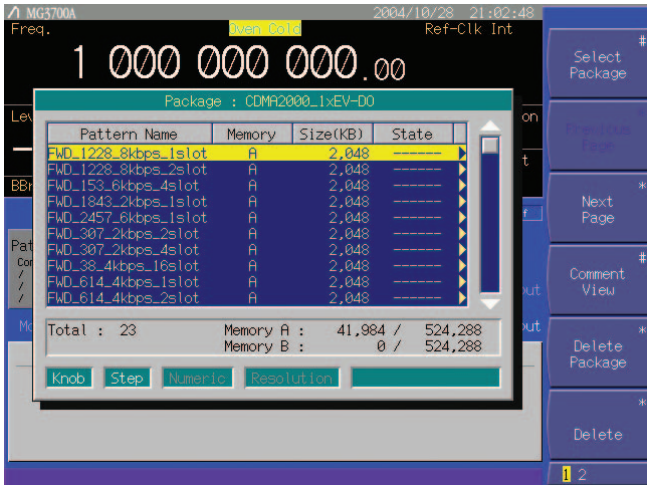
Output waveform screen of Wanted signal + Interfering signal

CDMA2000 1xEV-DO waveform pattern

Standard

■CDMA2000 1xEV-DO waveform pattern:

The CDMA2000 1xEV-DO waveform patterns listed on the right are provided on the MG3700A internal hard disk.
The signals for testing the receiver and transmitter of the CDMA2000 1xEV-DO access network (base station) and access terminal (mobile station), which are specified in 3GPP2, can be output by selecting one of these CDMA2000 1xEV-DO waveform patterns. Thirteen forward and ten reverse data rate waveform patterns are available.
When multi-carrier signals, mixed signals of idle and active, and/or multi-user signals are required, parameter setting and waveform pattern generation are available using the optional MX370103A CDMA2000 1xEV-DO IQproducer.



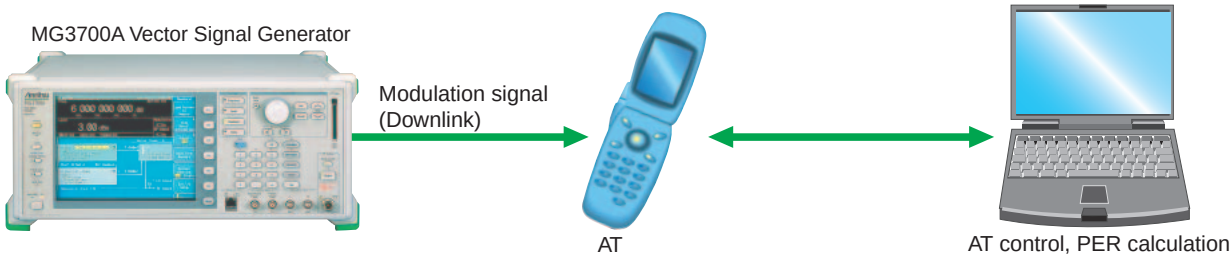
Example of selecting a waveform pattern

- Access terminal (AT) receiver test
  CDMA2000 1xEV-DO forward
  Base band filter: IS-95SPEC +EQ
  Data: PN15fix* (excluding FWD-Idle)
    FWD_38_4kbps_16slot
    FWD_76_8kbps_8slot
    FWD_153_6kbps_4slot
    FWD_307_2kbps_2slot
    FWD_614_4kbps_1slot
    FWD_307_2kbps_4slot
    FWD_614_4kbps_2slot
    FWD_1228_8kbps_1slot
    FWD_921_6kbps_2slot
    FWD_1843_2kbps_1slot
    FWD_1228_8kbps_2slot
    FWD_2457_6kbps_1slot
    FWD_Idle
- Access network (AN) receiver test
  CDMA2000 1xEV-DO Reverse
  Base band filter: IS-95SPEC
  Data: PN9fix*
    RVS_9_6kbps_RX
    RVS_19_2kbps_RX
    RVS_38_4kbps_RX
    RVS_76_8kbps_RX
    RVS_153_6kbps_RX
    RVS_9_6kbps_TX
    RVS_19_2kbps_TX
    RVS_38_4kbps_TX
    RVS_76_8kbps_RT
    RVS_153_6kbps_RT

* This is a PN sequence delimited for each packet. Therefore, the PN sequence is discontinuous between the end data of a packet and the start data of the next packet.

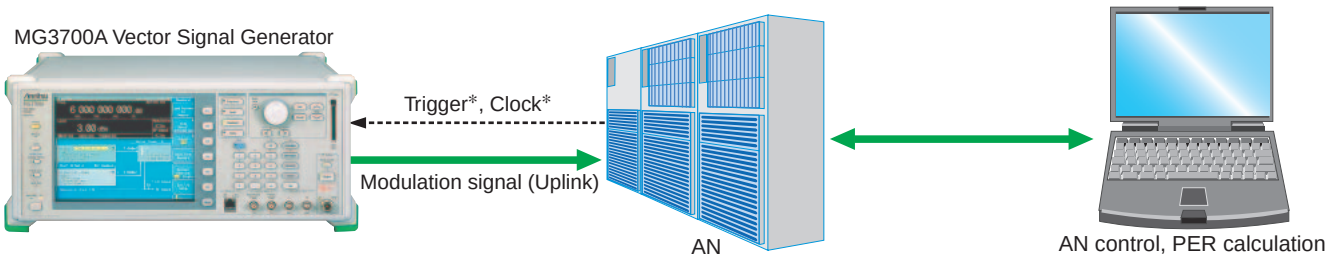
- Access terminal (AT) receiver test

3GPP2 C.S0033 standard receiver tests (PER: Packet Error Rate) can be performed by selecting a forward signal pattern required for testing the AT. No protocol is supported for the access network simulator. In addition, all the transmission channels are traffic, and all the other channels (e.g., Sync) are unsupported; it is necessary to calculate the PER by controlling the AT using an external controller.



•Access network (AN) receiver test

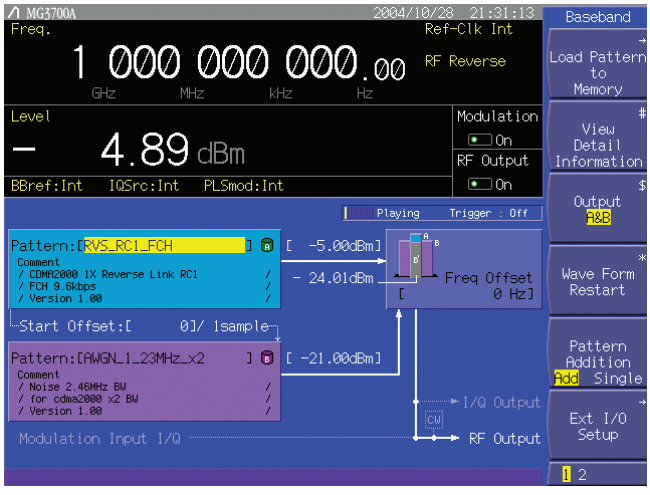
GPP2 C.S0032 standard receiver tests (PER: Packet Error Rate) can be performed by selecting a reverse signal pattern required for testing the AN. Since access terminal simulator protocols are not supported, an external controller must be used to control the AN and calculate PER.



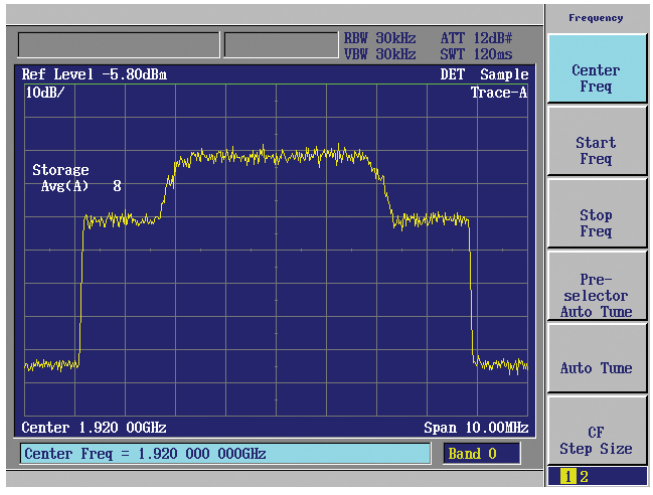
* Trigger: Timing for synchronizing the start of frame (frame trigger)
* Clock: Clock for synchronizing the chip rate 1.2288 Mcps (11 x 1.2288 MHz or 5MHz/10 MHz)

■AWGN Supports Dynamic Range Test (AWGN: Additive White Gaussian Noise)

When performing the receiver dynamic range test specified by 3GPP2, a 1xEV-DO modulation signal with AWGN is required. Either of the AWGN waveform patterns AWGN_1.23MHz_x2 or AWGN_1.23MHz_x1_5, which are stored on the MG3700A internal hard disk, can be used for an AWGN signal.
Since a single MG3700A can add a CDMA2000 uplink modulation signal and an AWGN signal internally and output them as a combined signal, it is useful for a simple dynamic range test for an AN receiver.



Wanted signal + AWGN screen



Output waveform screen of wanted signal + AWGN

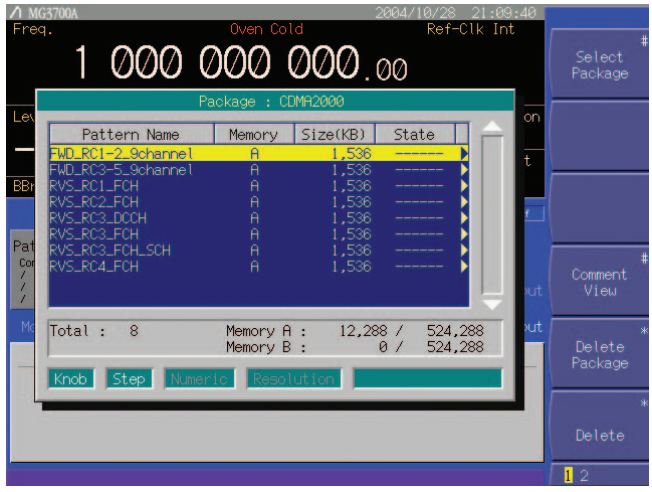
CDMA2000 waveform pattern

Standard

■CDMA2000 waveform pattern:

The CDMA2000 waveform patterns listed in the table below are provided on the MG3700A internal hard disk.
CDMA2000 modulation signals specified in 3GPP2 C.S0002-0-2 can be output by selecting one of these CDMA2000 waveform patterns.
Since reverse channel signals are output by channel coding (convolutional coding, etc.) 4-frame length PN9 fix*1 data, it is useful for Frame Error Rate (FER) measurement*2 of the base station, as well as device evaluation.

∗1: The data length is not an integer multiple of the PN sequence length (511 bits for PN9), and the PN sequence becomes discontinuous at the end.
∗2: This is the case where the timing signal and 1.2288 Mcps x 11 clock signal (or 5 or 10 MHz reference clock) can be input from the test target base station to the MG3700A in order to provide synchronization of the frame start point and chip clock.



Example of selecting waveform pattern

Waveform pattern	System	Frame coding	Symbol data
RVS_RC1_FCH	CDMA2000 1xRTT RC1 Reverse	Coded	FCH 9.6 kbps
RVS_RC2_FCH	CDMA2000 1xRTT RC2 Reverse	Coded	FCH 14.4 kbps
RVS_RC3_FCH	CDMA2000 1xRTT RC3 Reverse	Coded	PICH, FCH 9.6 kbps
RVS_RC3_FCH/SCH	CDMA2000 1xRTT RC3 Reverse	Coded	PICH, FCH 9.6 kbps, SCH 9.6 kbps
RVS_RC3_DCCH	CDMA2000 1xRTT RC3 Reverse	Coded	PICH, DCCH 9.6 kbps
RVS_RC4_FCH	CDMA2000 1xRTT RC4 Reverse	Coded	PICH, FCH 14.4 kbps
FWD_RC1-2_9channel	CDMA2000 1xRTT RC1, RC2 Forward	spreading only	PICH, SyncCH, PagingCH, FCH 19.2 ksps x 6
FWD_RC3-5_9channel	CDMA2000 1xRTT RC3, RC4, RC5 Forward	spreading only	PICH, SyncCH, PagingCH, FCH 38.4 ksps x 6

Waveform pattern		Walsh Code	Code Power	Data Rate	Data
RVS_RC1_FCH	R-FCH			9.6 kbps	PN9fix*
RVS_RC2_FCH	R-FCH			14.4 kbps	PN9fix*
RVS_RC3_FCH	R-PICH	0	–5.278 dB	N/A	All "0"
	R-FCH	4	–1.528 dB	9.6 kbps	PN9fix*
RVS_RC3_FCH/SCH	R-PICH	0	–7.5912 dB	N/A	All"0"
	R-FCH	4	–3.8412 dB	9.6 kbps	PN9fix*
	R-SCH	2	–3.8412 dB	9.6 kbps	PN9fix*
RVS_RC3_DCCH	R-PICH	0	–5.278 dB	N/A	All"0"
	R-DCCH	8	–1.528 dB	9.6 kbps	PN9fix*
RVS_RC4_FCH	R-PICH	0	–5.278 dB	N/A	All"0"
	R-FCH	4	–1.528 dB	14.4 kbps	PN9fix*
Waveform pattern		**Walsh Code**	**Code Power**	**Symbol Rate**	**Symbol Data**
FWD_RC1-2_9channel	F-PICH	0	–7.0 dB	N/A	All"0"
	F-SyncCH	32	–13.3 dB	4.8 kbps	PN9fix*
	PagingCH	1	–7.3 dB	19.2 kbps	PN9fix*
	F-FCH x6	8-13	–10.3 dB	19.2 kbps	PN9fix*
FWD_RC3-5_9channel	F-PICH	0	–7.0 dB	N/A	All"0"
	F-SyncCH	32	–13.3 dB	4.8 kbps	PN9fix*
	PagingCH	1	–7.3 dB	19.2 kbps	PN9fix*
	F-FCH x6	8-13	–10.3 dB	38.4 kbps	PN9fix*

R-PICH (Reverse Pilot Channel),
R-FCH (Reverse Fundamental Channel)
R-SCH (Reverse Supplemental Channel)
R-DCCH (Reverse Dedicated Control Channel)

F-PICH (Forward Pilot Channel),
F-SyncCH (Forward Sync Channel),
PagingCH (Paging Channel),
F-FCH (Forward Fundamental Channel)

GSM/EDGE waveform pattern

Standard

GSM/EDGE waveform pattern:

The GSM/EDGE waveform patterns listed in the table below are provided on the MG3700A internal hard disk.
The signals suitable for testing receivers and for managing device evaluation in a GSM/EDGE system can be output by selecting one of these GSM/EDGE waveform patterns.

- GMSK_PN9, 8PSK_PN9

PN9 data is inserted into the entire area of the slots, except the guard. The PN9 data in each slot are continuous.

- GMSK_TN0, 8PSK_TN0

PN9 data is inserted into the entire area of the slots, except the guard. The PN9 data in each slot are continuous.

- NB_TN0, NB_ALL

PN9 data is inserted into the normal burst encrypted bit area. The PN9 data in the slots are continuous.

- TCH_FS

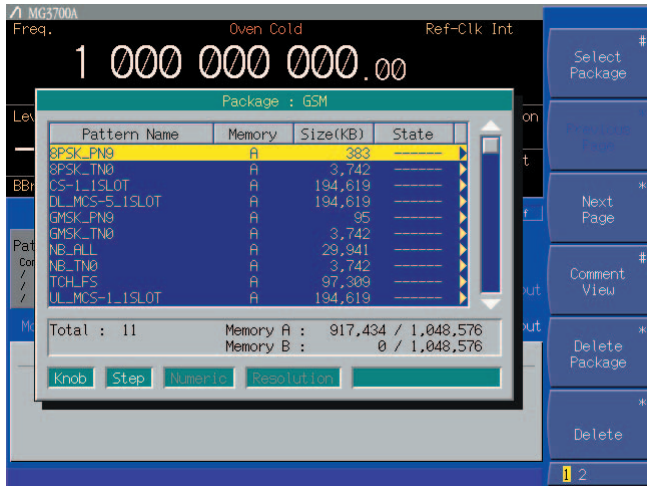
Supports the Speech channel at the full rate (TCH/FS) specified in Section 3.1 of 3GPP TS05.03.

- CS-1_1 (4)_SLOT (_4SLOT)

Supports the packet data block type 1 (CS-4) and 4 (CS-1) specified in Section 5.1 of 3GPP TS05.03.

- DL (UL)_MCS-1 (5, 9)_1SLOT (_4SLOT)

Supports the packet data block types 5(MCS-1), 9(MCS-5), and 13 (MCS-9) specified in Section 5.1 of 3GPP TS05.03.



Example of selecting waveform pattern

Waveform pattern	Uplink / Downlink	Data	Output slot	Communications
GMSK_PN9	Uplink / Downlink	PN9 *1	—	—
8PSK_PN9	Uplink / Downlink		—	—
GMSK_TN0	Uplink / Downlink	PN9 *2	TN0	—
8PSK_TN0	Uplink / Downlink		TN0	—
NB_TN0	Uplink / Downlink	PN9 *3	TN0	GSM
NB_ALL	Uplink / Downlink		All slot	
TCH_FS	Uplink / Downlink	PN9 *4	TN0	
CS-1_1SLOT	Uplink / Downlink		TN0	
CS-4_1SLOT	Uplink / Downlink		TN0	
DL_MCS-1_1SLOT	Downlink		TN0	GPRS
UL_MCS-1_1SLOT	Uplink		TN0	
DL_MCS-5_1SLOT	Downlink		TN0	EDGE
UL_MCS-5_1SLOT	Uplink		TN0	
DL_MCS-9_1SLOT	Downlink		TN0	
UL_MCS-9_1SLOT	Uplink		TN0	
DL_MCS-9_4SLOT	Downlink		TN0, 1, 2, 3	
UL_MCS-9_4SLOT	Uplink		TN0, 1, 2, 3	

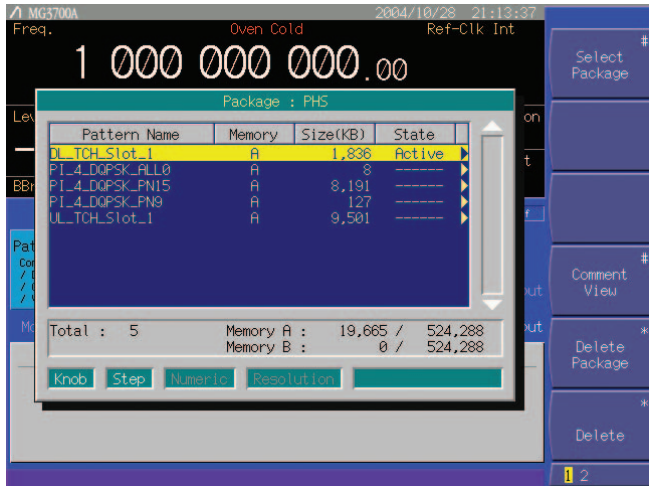
*1: PN9 data is inserted into the entire area that does not have the slot format.
*2: PN9 data is inserted into the entire area of the slots, except the guard.
*3: PN9 is inserted into the normal burst encrypted bit area.
*4: The bit string channel-coded for PN9 data is inserted into the normal burst encrypted bit area.

PHS waveform pattern

Standard

PHS waveform pattern:

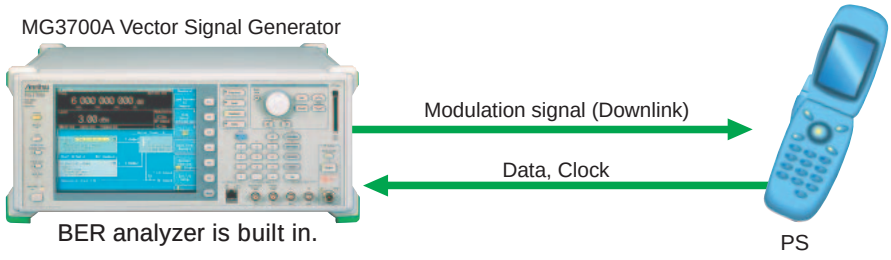
The PHS waveform patterns listed in the table below are provided on the MG3700A internal hard disk.
The signals for testing CS (base station) and PS (mobile station) receivers, which are specified in RCR STD-28, can be output by selecting one of these PHS waveform patterns, without setting any complex RCR STD-28 parameters.
When a signal that has parameters different from those of the provided waveform patterns are required, parameter setting and waveform pattern generation are available using the optional MX370102A TDMA IQproducer.



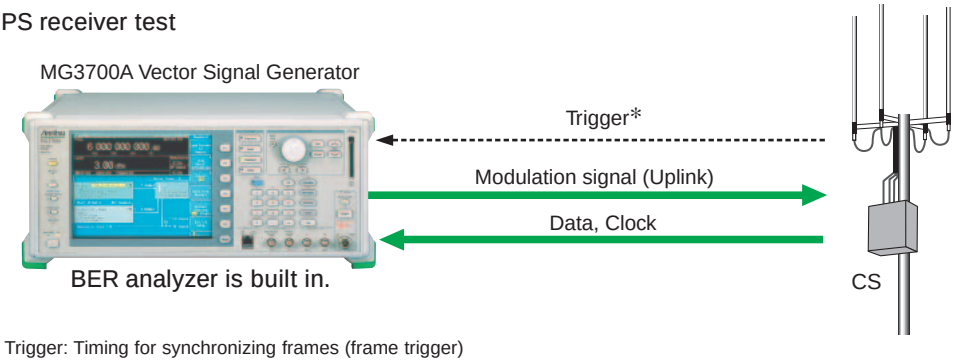
Example of selecting waveform pattern

Waveform pattern	Uplink / Downlink	Scramble	Output slot
PI_4_DQPSK_PN9	—	OFF	No frame
PI_4_DQPSK_PN15	—	OFF	No frame
PI_4_DQPSK_ALL0	—	OFF	No frame
DL_TCH_Slot_1	Downlink	OFF	Slot1: TCH Slot 2 to 4: off
UL_TCH_Slot_1	Uplink	OFF	Slot1: TCH Slot 2 to 4: off

• PS receiver test



• PS receiver test



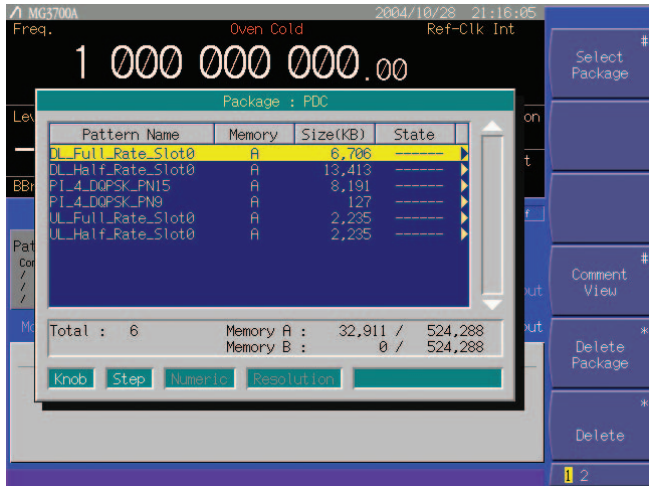
* Trigger: Timing for synchronizing frames (frame trigger)

PDC waveform pattern

Standard

PDC waveform pattern:

The waveform patterns for the wanted signals/interfering signals required to execute transmission/reception tests as specified in ARIB STD-27 are provided on the MG3700A internal hard disk. Modulation signals conforming to the standard can be output without any options (Note: Check the parameters listed on the next page in advance).
The waveform pattern to output uplink/downlink Slot 0 data only and the unframed waveform pattern for interfering signals are provided for full rate and half rate, respectively.
When a signal is required that has parameters different from those of the provided waveform patterns, parameter setting and waveform pattern generation are available using the optional MX370102A TDMA IQproducer.



Example of selecting waveform pattern

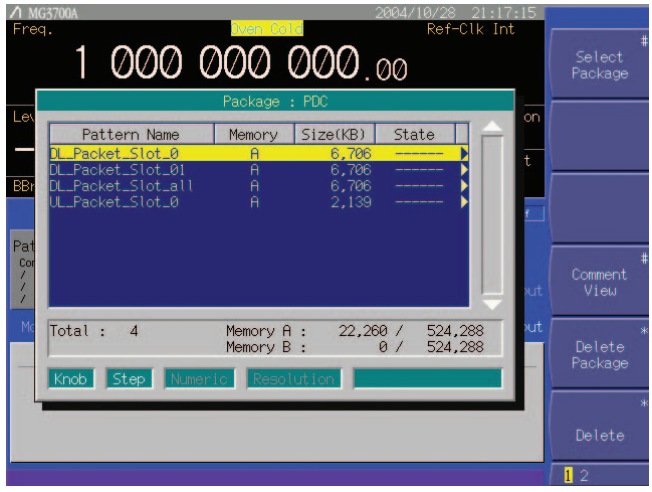
Waveform pattern	Uplink / Downlink	Half rate / Fill rate	Output slot	Evaluation
PI_4_DQPSK_PN9	—	—	No frame	TX device test
PI_4_DQPSK_PN15	—	—	No frame	Interfering signal
DL_Full_Rate_Slot0	Downlink	Full rate	Slot 0 only	Wanted signal for receiver test
DL_Half_Rate_Slot0	Downlink	Half rate	Slot 0 only	
UL_Full_Rate_Slot0	Uplink	Full rate	Slot 0 only	
UL_Half_Rate_Slot0	Uplink	Half rate	Slot 0 only	

PDC Packet waveform pattern

Standard

PDC Packet waveform pattern:

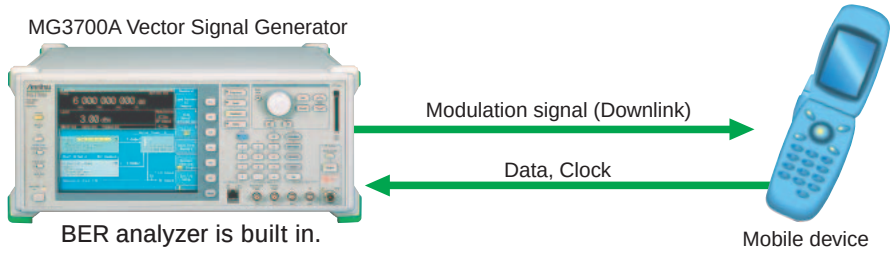
The four types of waveform patterns listed in the table below are provided on the MG3700A internal hard disk.
The signals for testing base station and mobile station receivers for UPCH communications, which are specified in RCR STD-27, can be output by selecting one of these waveform patterns, without setting any complex RCR STD-27 parameters. Also, the Downlink3 data rate UPHC pattern and Uplink1 UPHC pattern can be switched.
When a signal is required that has parameters different from those of the provided waveform patterns, parameter setting and waveform pattern generation are available using the optional MX370102A TDMA IQproducer.



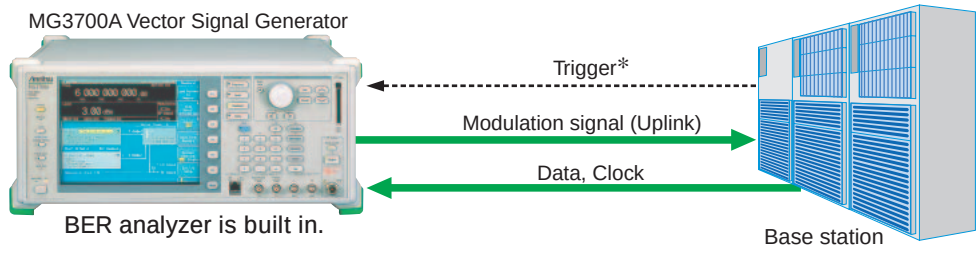
Example of selecting waveform pattern

Waveform pattern	Uplink / Downlink	Output slot
DL_Packet_Slot_0	Downlink	Slot 0 = UPCH Slot 1 = IDLE (all "1") Slot 2 = IDLE (all "1")
DL_Packet_Slot_01	Downlink	Slot 0 = UPCH Slot 1 = UPCH Slot 2 = IDLE (all "1")
DL_Packet_Slot_all	Downlink	Slot 0 = UPCH Slot 1 = UPCH Slot 2 = UPCH
UL_Packet_Slot_0	Uplink	Slot 0 = UPCH Slot 1 = Transmit off Slot 2 = Transmit off

• Mobile station test



• Base station test



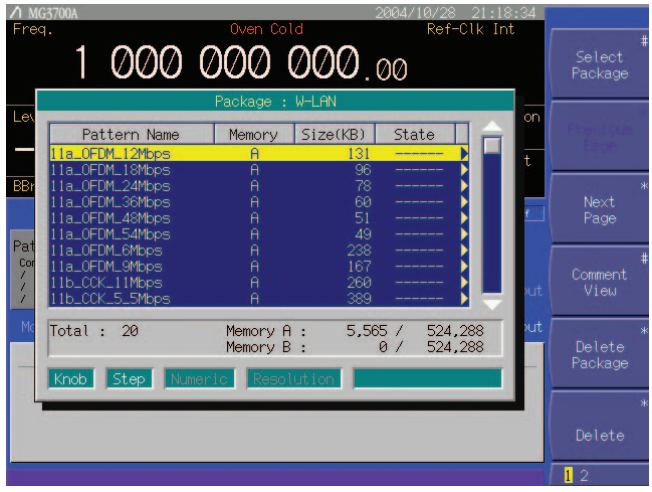
* Trigger: Timing for synchronizing sub frames (frame trigger)

WLAN waveform pattern

Standard

WLAN waveform pattern:

The WLAN (IEEE802.11a/b/g) waveform patterns listed in the table below are provided on the MG3700A internal hard disk. The signals for testing the receiver/transmitter of a terminal or module can be output by selecting one of these WLAN waveform patterns.



Example of selecting waveform pattern

• IEEE_802.11a waveform pattern list

Waveform pattern	Data rate (Mbits/s)	Modulation	Coding rate	Coding bits per sub-carrier	Coding bits per OFDM symbol	Data bits per OFDM symbol
11a_OFDM_6Mbps	6	BPSK	1/2	1	48	24
11a_OFDM_9Mbps	9	BPSK	3/4	1	48	36
11a_OFDM_12Mbps	12	QPSK	1/2	2	96	48
11a_OFDM_18Mbps	18	QPSK	3/4	2	96	72
11a_OFDM_24Mbps	24	16-QAM	1/2	4	192	96
11a_OFDM_36Mbps	36	16-QAM	3/4	4	192	144
11a_OFDM_48Mbps	48	64-QAM	2/3	6	288	192
11a_OFDM_54Mbps	54	64-QAM	3/4	6	288	216

• IEEE_802.11b waveform pattern list

Waveform pattern	Spreading, Coding	Modulation
11b_DSSS_1Mbps	DSSS, 11 chip Barker Code	DBPSK
11b_DSSS_2Mbps	DSSS, 11 chip Barker Code	DQPSK
11b_CCK_5_5Mbps	CCK	DQPSK
11b_CCK_11Mbps	CCK	DQPSK

• IEEE_802.11g waveform pattern list

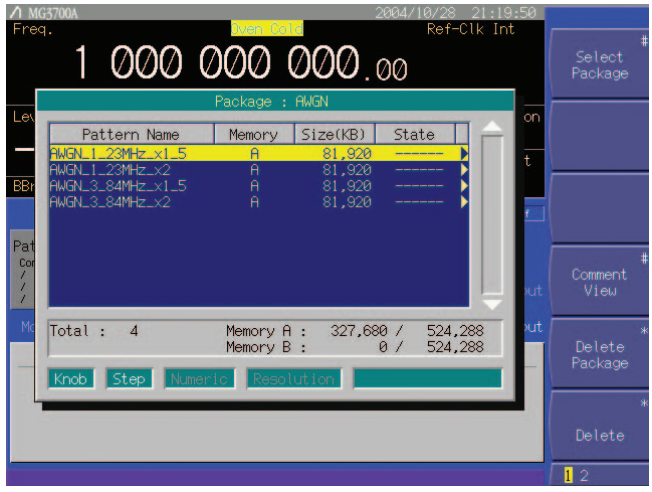
Waveform pattern	Data rate (Mbits/s)	Modulation	Coding rate	Coding bits per sub-carrier	Coding bits per OFDM symbol	Data bits per OFDM symbol
11g_DSSS_OFDM_6Mbps	6	BPSK	1/2	1	48	24
11g_DSSS_OFDM_9Mbps	9	BPSK	3/4	1	48	36
11g_DSSS_OFDM_12Mbps	12	QPSK	1/2	2	96	48
11g_DSSS_OFDM_18Mbps	18	QPSK	3/4	2	96	72
11g_DSSS_OFDM_24Mbps	24	16-QAM	1/2	4	192	96
11g_DSSS_OFDM_36Mbps	36	16-QAM	3/4	4	192	144
11g_DSSS_OFDM_48Mbps	48	64-QAM	2/3	6	288	192
11g_DSSS_OFDM_54Mbps	54	64-QAM	3/4	6	288	216

AWGN waveform pattern

Standard

■ AWGN waveform pattern:

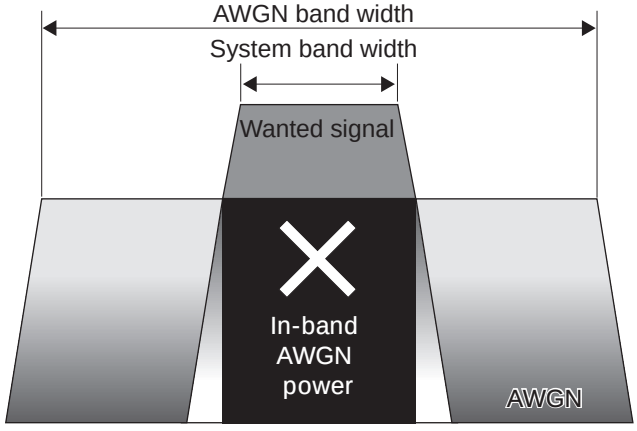
The Additive White Gaussian Noise (AWGN) waveform patterns listed in the table below are provided on the MG3700A internal hard disk.
The signals for testing the receiver/transmitter of a terminal or module can be output by selecting one of these AWGN waveform patterns.

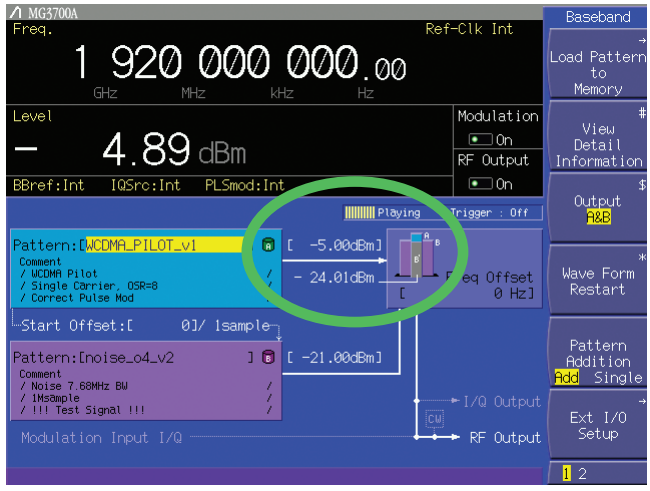


Example of selecting a waveform pattern

Waveform pattern	MAX peak/RMS ratio	3dB bandwidth (MHz)	In-band power conversion ratio (dB)*	Evaluation
AWGN_3_84MHz_x2	>12 dB	7.68	3.01	Added with the W-CDMA UL signal to perform a dynamic range test.
AWGN_3_84MHz_x1_5	>12 dB	5.76	1.76	Added with the W-CDMA UL signal to perform a dynamic range test.
AWGN_1.23MHz_x2	>12 dB	2.46	3.01	Added with the reverse signals of CDMA2000 or CDMA2000 1xEV-DO to perform a dynamic range test.
AWGN_1.23MHz_x1_5	>12 dB	3.69	1.76	Added with the reverse signals of CDMA2000 or CDMA2000 1xEV-DO to perform a dynamic range test.

* In-band power conversion ratio is the ratio of the system bandwidth of each communication system to the total power of the MG3700A output measured with a power meter or another equivalent device.

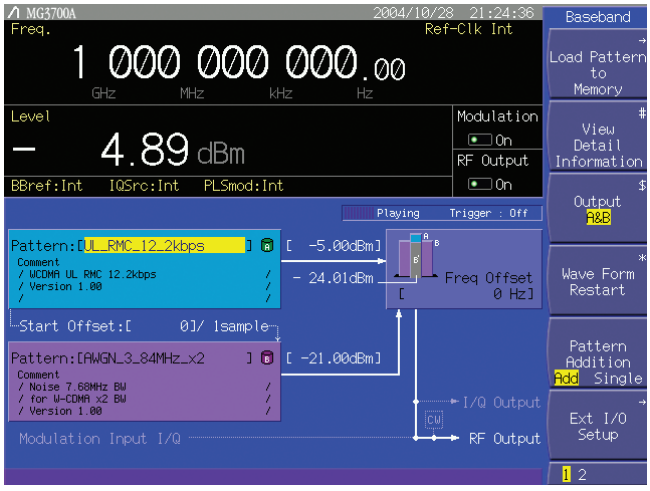




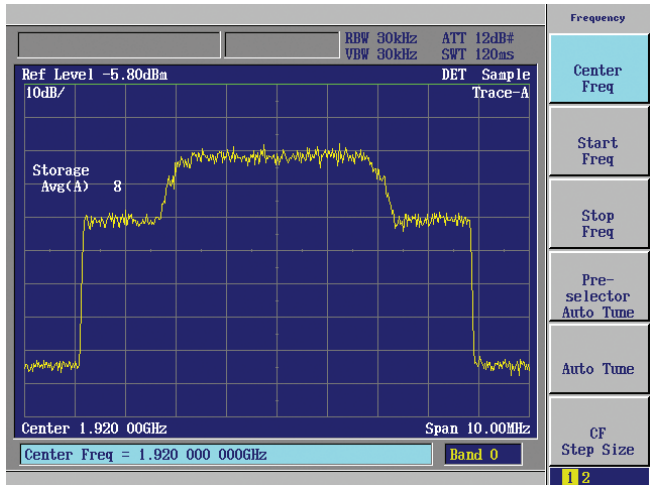
In-band AWGN power

■ With the waveform combine function, a single MG3700A outputs a signal that is the addition (such as modulation signal + AWGN) of the wanted signal and interfering signal:

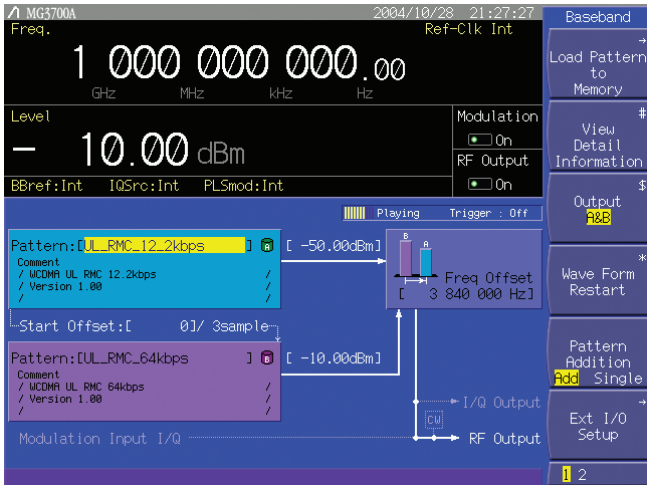
The MG3700A has ARB memory that consists of two memory areas, each allowing one waveform pattern to be set. The addition of the signals from the two memories, as well as the signal for either one, can be output.
For example, if a wanted signal (W-CDMA, CDMA2000) waveform pattern is selected for one memory and an interfering signal (AWGN) waveform pattern for the other, a signal that is the addition of the wanted signal and interfering signal (AWGN) shown in the upper figures below can be output with a single MG3700A.
Also, if a modulation signal is selected as the interfering signal, the addition of the wanted signal and interfering signal (modulation signal) shown in the lower figures below can also be output with a single MG3700A.
Furthermore, the accuracy of the level ratio is superior since the S/N adjustment and calculation are performed by digital processing.



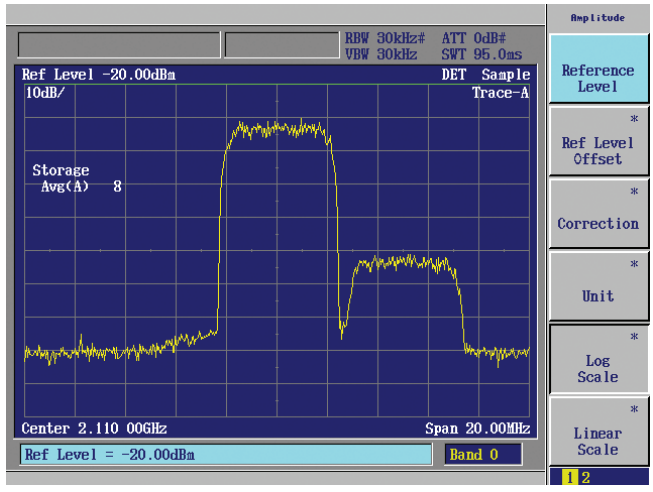
Wanted signal + AWGN screen



Output waveform screen of wanted signal + AWGN



Wanted signal + interfering signal screen



Output waveform screen of wanted signal + interfering signal

MX370001A TD-SCDMA waveform pattern

Optional

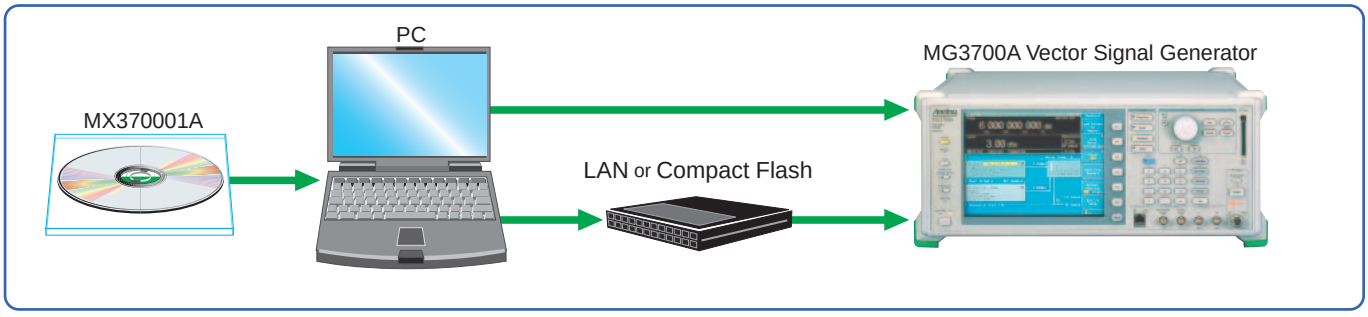
TD-SCDMA waveform pattern:

The signals corresponding to the 3GPP 1.28Mcps TDD options can be output by installing the MX370001A TD-SCDMA waveform pattern on the MG3700A.

- For evaluating transmitter of BS
  (TS 25.141 Test Model 1 to 4)
  - BS_DL RMC 1Code
  - BS_DL RMC 1Code+P-CCPCH
  - BS_DL RMC 8Code
  - BS_DL RMC 10Code
- For evaluating receiver of BS
  - BS_UL RMC 12.2k(Single)
  - BS_UL RMC 12.2k+OCNS
  - BS_UL RMC 64k+OCNS
  - BS_UL RMC 144k+OCNS
  - BS_UL RMC 384
- For evaluating receiver of UE
  - UE_DL RMC 12.2k
  - UE_DL RMC 12.2k+OCNS
  - UE_DL RMC 64k+OCNS
  - UE_DL RMC 144k+OCNS
  - UE_DL RMC 384

Simple operation and high speed signal pattern change:

Typical waveforms specified in 3GPP, such as the reference management channel, can be output simply by selecting the waveform pattern loaded from the MG3700A internal hard disk to the large-capacity ARB memory, without setting any complex TD-SCDMA parameters.



- Waveform patterns for evaluating BS transmitters

Target of test	BS Transmitter Test (DL)			
	BS			
Test signal	BS-DL RMC			
Waveform pattern	rmc_1 code_bs_dl	rmc_P-CCPCH_bs_dl	rmc_8 code_bs_dl	rmc_10 code_bs_dl
Test	Freq / Power Ctrlr / Minimum Pwr	PCCPCH Pw	OBW / On Off Ratio / Max Pwr / spurious / ACLR / TxIM	EVM / Peak code domain err
Standard	TS25.142			
DwPTS/UpPTS SYNC_DL/UL NUMBER (quadruples)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)
P-CCPCH	—	add	—	—
Scrambling Code	0	0	0	0
midamble ID	0	0	0	0
Maximum User (user number)	2 (1)	8 (1)	2 (1)	2 (1)
Spread Factor	16	16	16	16
Time Slot Number	4, 5, 6	0	4, 5, 6	4, 5, 6
Number of DPCH0	—	—	0	0
DPCH Channelization Codes	C (i, 16), i = 1	C (i, 16), i = 1, 2	C (i, 16), 1 ≤ i ≤8	C(i, 16), 1 ≤ i ≤10
DPCH0 Channelization Codes	—	—	—	—
Data:DPCH0	PN9	—	PN9	PN9
Data: other channel	—	P-CCPCH:All 0	—	—
∑ DPCH_Ec/Ior [dB]	0	—	0	0
DPCH0_Ec/Ior [dB]	—	—	—	—
DPCH Channelization Codes Power [dB]/1 ch	0	—	–9	–10
DPCH0 Channelization Codes Power [dB]/1 ch	—	—	—	—

• Waveform patterns for evaluating BS receivers

Target of test	BS Receive Test (UL)				
	BS				
Test signal	BS-UL RMC				
Waveform patterns	rmc12_2k_bs_ul	rmc12k_ocns_bs_ul	rmc64k_ocns_bs_ul	rmc144k_bs_ul	rmc384k_bs_ul
Test	RS / Min. Input Lev. / Dynamic range / ACS / Blocking / Rx IM	Performance Req.	Performance Req.	Performance Req.	Performance Req.
Standard	TS25.142				
DwPTS/UpPTS/SYNC_DL/UL NUMBER (quadruples)	—	—	—	—	—
P-CCPCH	—	—	—	—	—
Scrambling Code	0	0	0	0	0
midamble ID	0	0	0	0	0
Maximum User (user number)	2 (1)	2 (1)	2 (1)	2 (1)	2 (1)
Spread Factor	8	8	2, 8	2, 8	8, 2
Time Slot Number	1	1	1	1, 2	1, 2, 3, 4
Number of DPCH	0	4	1	1	0
DPCH Channelization Codes	C (i, 8), i = 1	C (i, 8), i = 1	C (i, 2), i = 1	C (i, 2), i = 1	C (i, 2) i = 1 C (i, 8) i = 5
DPCH0 Channelization Codes	—	C (i, 8), 2≤ i ≤5	C (i, 8), i = 5	C (i, 8), i = 5	—
Data: DPCH0	PN9	PN9	PN9	PN9	PN9
Data: other channel	—	PN9	PN9	PN9	—
∑ DPCH_Ec/Ior [dB]	0	—	—	—	0
DPCH0_Ec/Ior [dB]	—	–7	–7	–7	—
DPCH Channelization Codes Power [dB] / 1 ch	0	–7	–0.97	–0.97	C (i, 2) = –6.99 C (i, 8) = –0.97
DPCH0 Channelization Codes Power [dB] / 1 ch	—	–7	–7	–7	—

• Waveform patterns for evaluating receiver of UE

Target of test	UE Receiver Test (DL)				
	UE				
Test signal	UE-DL RMC				
Waveform pattern	rmc12_2k_ue_dl	rmc12k_ocns_ue_dl	rmc64k_ocns_ue_dl	rmc144k_ocns_ue_dl	rmc384k_ue_dl
Test	RS / Min. Input Lev. / ACS / Blocking / Spur.Resp. / Inter Mod	Maximum input level test / RMC 12.2k	Performance Req.	Performance Req.	Performance Req.
Standard	TS25.102				
DwPTS/UpPTS SYNC_DL/UL NUMBER (quadruples)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)	SYNC_DL #0 (S1)
P-CCPCH	Add	Add	Add	Add	Add
Scrambling Code	0	0	0	0	0
midamble ID	0	0	0	0	0
Maximum User (user number)	8 (1)	8 (1)	8 (1)	8 (1)	8 (1)
Spread Factor	16	16	16	16	16
Time Slot Number	4	4	4	4, 5	3, 4, 5, 6
Number of DPCH0	0	8	2	2	0
DPCH Channelization Codes	C (i, 16), i = 1, 2	C (i, 16), i = 1, 2	C (i, 16), i = 1,⋯, 8	C (i, 16), i = 1,⋯, 8	C (i, 16)i = 1,⋯, 10
DPCH0 Channelization Codes	—	C (i, 16) 3≤ i ≤10	C (i, 16) 9≤ i ≤10	C (i, 16) 9≤ i ≤10	—
Data:DPCH0	PN9	PN9	PN9	PN9	PN9
Data: other channel	—	PN9	PN9	PN9	—
∑ DPCH_Ec/Ior [dB]	0	–7	—	—	—
DPCH0_Ec/Ior [dB]	—	–10	–10	–10	0
DPCH Channelization Codes Power [dB] / 1ch	–3.01	–10.00	–10.00	–10.00	–10
DPCH0 Channelization Codes Power [dB / 1 ch	—	–10.00	–10.00	–10.00	—

MX370001A TD-SCDMA waveform pattern

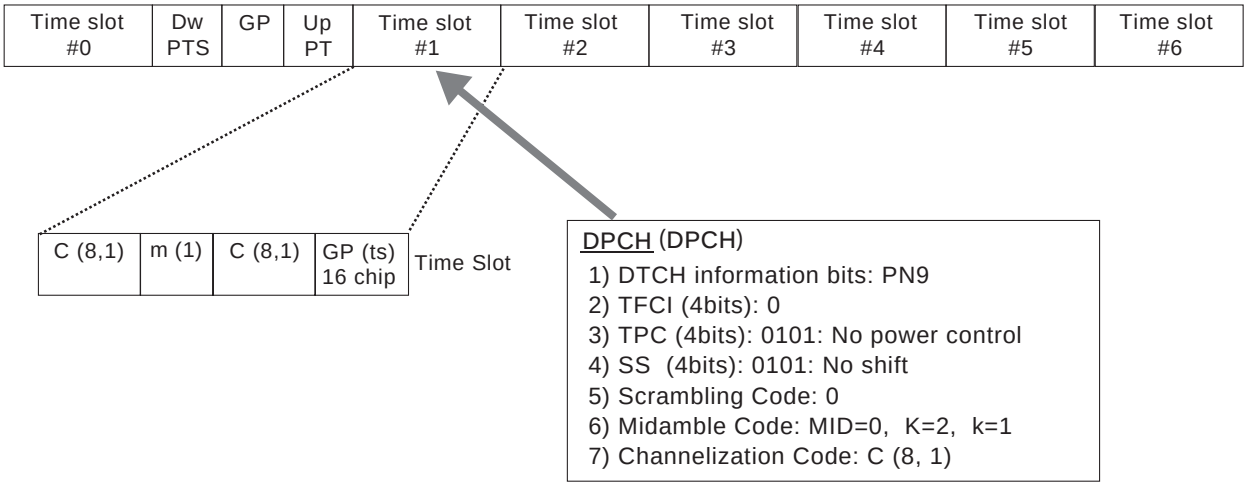
Optional

■ Frame configuration

•UL-RMC12.2 kbps: For BS receiver test (Uplink):

TS-25.142: BS UL reference measurement channel p132, A2.1.2, 1.28 MCps, SF = 8

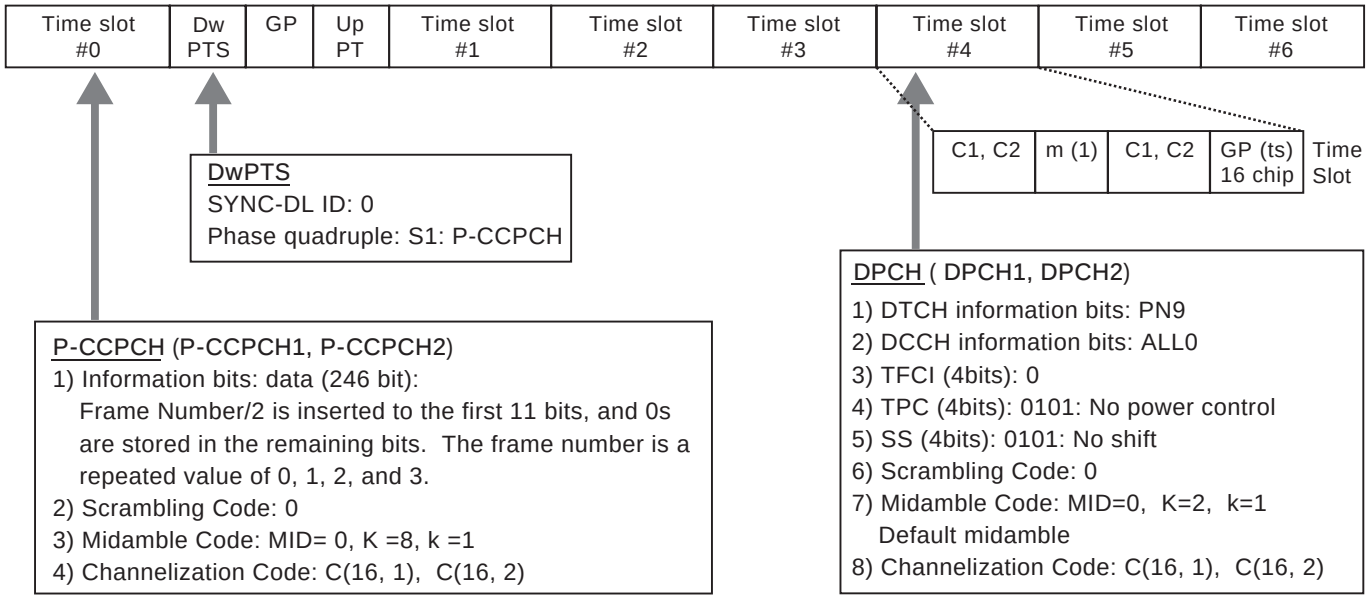
Test items: 7.2 Reference sensitivity level / 7.3 Dynamic range / 7.4 Adjacent Channel Selectivity (ACS) / 7.5 Blocking characteristics / 7.6 Inter modulation characteristics



•UL-RMC12.2 kbps: For UE receiver test (Uplink):

TS-25.102: UE DL reference measurement channel p58, A.2.2.2.1, 1.28 MCps, 12.2 kbps, SF = 16

Test items: 7.3 Reference sensitivity level / 7.4 Maximum input level / 7.5 Adjacent Channel selectivity (ACS) / 7.6 Blocking characteristics / 7.7 Spurious response / 7.8 Inter modulation characteristics



MX370002A Public radio system waveform pattern

Optional

Public radio system waveform pattern:

The downlink/uplink modulation signals of the following ARIB standards can be output by installing the MX370002A Public radio system waveform pattern on the MG3700A:

•RCR STD-39

Waveform pattern	Uplink / Downlink	Transmit frame
UpLink	Uplink	0, x, x, x
DownLink 1	Downlink	0, x, x, x
DownLink 4	Downlink	0, 1, 2, 3
DownCCH 4	Downlink	0, 1, 2, 3
PN9	—	—
PN15	—	—

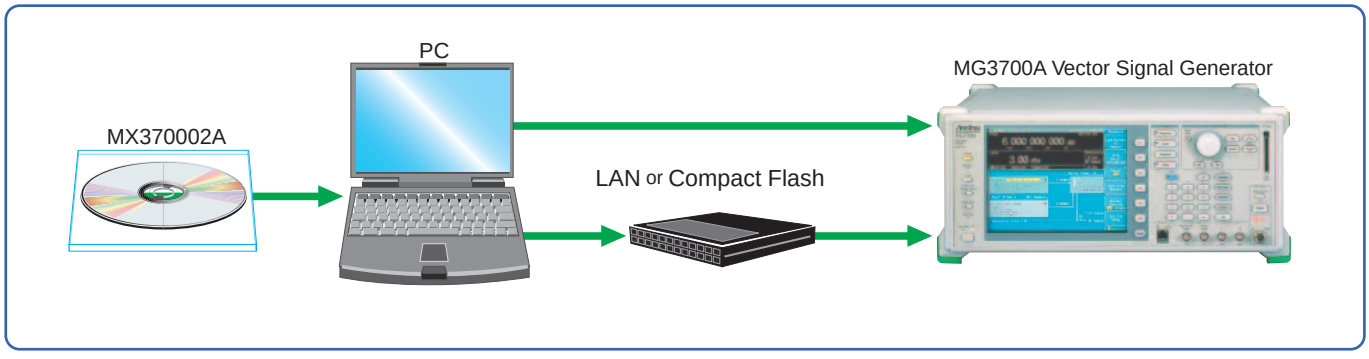
Sampling Rate 128 kHz
Symbol Rate 16 kHz

•ARIB STD-T61

Waveform pattern	Uplink / Downlink	Transmit frame
UpDownLink	Uplink / Downlink	0, 0, 0, 0
40ms_Burst_all	Uplink / Downlink	0, 1, 2, 3
20ms_Burst_all	Uplink / Downlink	0, 1, 2, 3
40ms_Burst_1_4	Uplink / Downlink	0, x, x, x,
20ms_Burst_1_8	Uplink / Downlink	0, x, x, x, x, x, x, x
PN9	—	—
PN15	—	—

Sampling Rate 76.8 kHz
Symbol Rate 4.8 kHz

The signals for testing the receiver/tester specified in the ARIB standards can be output by selecting a waveform pattern loaded from the MG3700A internal hard disk to the large-capacity ARB memory, without setting any complex ARIB standard
parameters. The TCH/CCH pattern, PN9 pattern, and PN15 continuous modulation pattern can be switched quickly.



MX370002A Public radio system waveform pattern

Optional

•ARIB STD-T79

Waveform pattern	Uplink / Downlink	Transmit frame
UpLink	Uplink	0, x, x, x
DownLink 1	Downlink	0, x, x, x
DownLink 4	Downlink	0, 1, 2, 3
Direct	Uplink / Downlink	1, x, x, x
PN9	—	—
PN15	—	—

Sampling Rate 128 kHz
Symbol Rate 16 kHz

•ARIB STD-T86

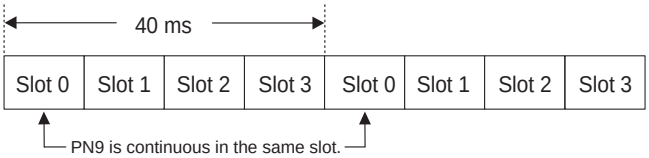
Waveform pattern	Uplink / Downlink	Transmit frame
Down_tch	Uplink	0, 1, 2, x, 4, 5
Down_tch_all	Downlink	0, 1, 2, x, 4, 5
Down_cch	Downlink	x, x, x, 3, x, x
Up_tch	Uplink	x, x, x, 3, x, x
Up_cch	Uplink	x, x, x, 3, x, x
PN9	—	—
PN15	—	—

Sampling Rate 90 kHz
Symbol Rate 11.25 kHz

■Frame configuration

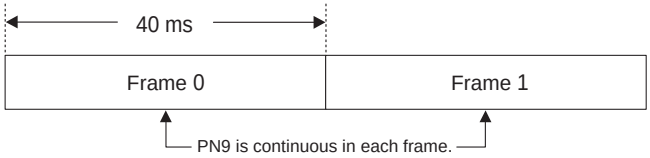
•RCR STD-39, ARIB STD-T79 frame configuration

The uplink frame (TDMA) and downlink frame (TDM) both generate data in frame cycles of 4-slot length (40 ms) defined as a basic frame length. The PN9 pseudo random pattern of the traffic channel (hereinafter called TCH) in a slot is independent per slot and has continuity.



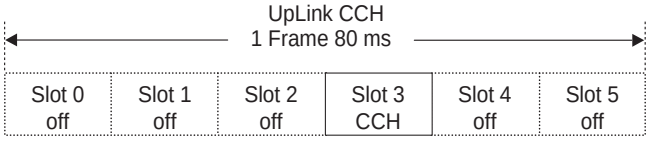
•ARIB STD-T61 frame configuration

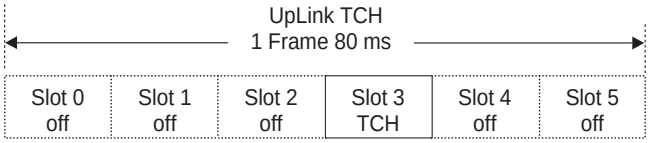
The uplink/downlink frames both generate data in cycles of 40 ms defined as a basic frame length. The PN9 pseudo random pattern of TCH in a frame has continuity in each frame.

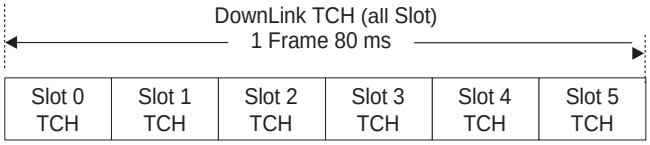


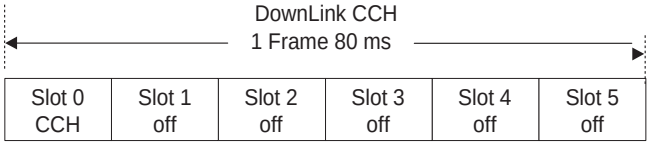
•ARIB STD-T86 frame configuration

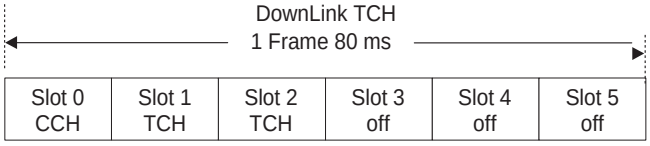
One frame consists of 6 slots and the data is generated in this frame cycle. The PN9 pseudo random pattern of TCH in a slot has continuity in all slots.











Signal formats in each system

•RCR STD-39, slot format

The signal formats in uplink/downlink are as follows.

• Uplink

R	P	TCH	SW	I	CC	SACCH	TCH	G
6	2	148	20	2	6	20	108	8

R: Guard time for burst transient response	00H (6 bit)
P: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
SW: Sync word	785B4H (Slot 0) (20 bit)
I: Idle bit (all "0")	0H (2 bit)
CC: Color code (Counterinterference code)	00H (6 bit)
SACCH: Slow ACCH	00000H (20 bit)
G: Guard time	00H (8 bit)

•Downlink

R	P	TCH	SW	CI	CC	SACCH	TCH	B/I
6	2	112	20	2	6	20	144	8

R: Guard time for burst transient response	00H (6 bit)
P: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
SW: Sync word	87A4BH (Slot 0), 9D236H (Slot 1), 81D75H (Slot 2), A94EAH (Slot 3) (20 bit)
CI: Control channel communication information	11H (2 bit)
CC: Color code (Counterinterference code)	00H (6 bit)
SACCH: Slow ACCH	00000H (20 bit)
B/I: Busy/Idle bit	FFH (8 bit)

•ARIB STD-T61, Frame format

The signal formats in uplink/downlink are as follows.

LP+R	Pa	TCH	RI	SW	undefined	TCH
30	2	96	56	20	20	160

LP+R: Preamble for linearizer and guard time for burst transient response	00000000H (30 bit)
Pa: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
RI: Radio information channel	00000000000000H (56 bit)
SW: Sync word	1E56FH (20 bit)
Undefined:	00000H (20 bit)

•ARIB STD-T79, Slot format

The signal formats in uplink/downlink and direct communication between mobile stations are as follows.

• Uplink

R	P	TCH	SW	I	CC	SACCH	TCH	G
6	2	148	20	2	6	20	108	8

R: Guard time for burst transient response	00H (6 bit)
P: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
SW: Sync word	785B4H (Slot 0) (20 bit)
I: Idle bit (all "0")	0H (2 bit)
CC: Color code (Counterinterference code)	00H (6 bit)
SACCH: Slow ACCH	00000H (20 bit)
G: Guard time for transient response	00H (8 bit)

•Downlink

R	P	TCH	SW	CI	CC	SACCH	TCH	B/I
6	2	112	20	2	6	20	144	8

R: Guard time for burst transient response	00H (6 bit)
P: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
SW: Sync word	87A4BH (Slot 0), 9D236H (Slot 1), 81D75H (Slot 2), A94EAH (Slot 3) (20 bit)
CI: Control channel communication information	11H (2 bit)
CC: Color code (Counterinterference code)	00H (6 bit)
SACCH: Slow ACCH	00000H (20 bit)
B/I: Busy/Idle bit	FFH (8 bit)

• Direct communication between mobile stations

G	R	P	TCH	SW	PICH	TCH	G
8	6	2	140	20	12	116	16

G: Guard time for transient response	00H (8 bit), 0000H (16 bit)
R: Guard time for burst transient response	00H (6 bit)
P: Preamble	2H (2 bit)
TCH: Traffic channel	Continuous PN9
SW: Sync word	4D9DEH (20 bit)
PICH: Parameter information channel	000H (12 bit)

•ARIB STD-T86, Slot format

There are four types of slots: uplink/downlink traffic channels and uplink/downlink control channels.

• Uplink / Downlink traffic channel

R	TCH	P	TCH	SW	C	TCH	P	TCH	G
16	24	4	232	40	4	232	4	24	20

R: Ramp time for transient response	0H (16 bit)
P: Pilot symbol	AH (4 bit)
SW: Sync word	Uplink=00A000000AH (40 bit) Downlink=00A000AAAAH (40 bit)
C: Channel identification	8H (4 bit)
TCH: Information channel	PN9 pseudo random pattern (The PN pattern has continuity in TCH of all slots.)
G: Guard time for transient response	00000H (20 bit)

• Uplink / Downlink control channel

R	AP	P	AP	SW	C	CAC	P	CAC	G
16	24	4	232	40	4	232	4	24	20

R: Ramp time for transient response	0H (16 bit)
AP: Repetition of AGC preamble	20A800080AH
P: Pilot symbol	AH (4 bit)
SW: Sync word	Uplink=000A0AA00AH (40 bit) Downlink=000A0A00A0H (40 bit)
C: Channel identification	AH (4 bit)
CAC: Information channel random pattern	
G: Guard time for transient response	00000H (20 bit)

MX370101A HSDPA IQproducer

Optional

HSDPA IQproducer:

The MX370101A HSDPA IQproducer is GUI-driven PC application software used to set up the parameters and generate waveform patterns according to the 3GPP HSDPA (Uplink/Downlink) system. The generated waveform patterns are downloaded to the MG3700A, and used to output HSDPA Modulation baseband signals and RF signals with the ARB generation function of the MG3700A.
In addition, it is possible to set the parameters specified in TS25.212 with respect to HS-PDSCH and HS-DPCCH. The signals in various states can be generated by changing the transmitting process freely.
In addition, the Downlink Easy Setup function provides typical items and parameters so that the settings can be executed simply by selecting items/parameters.

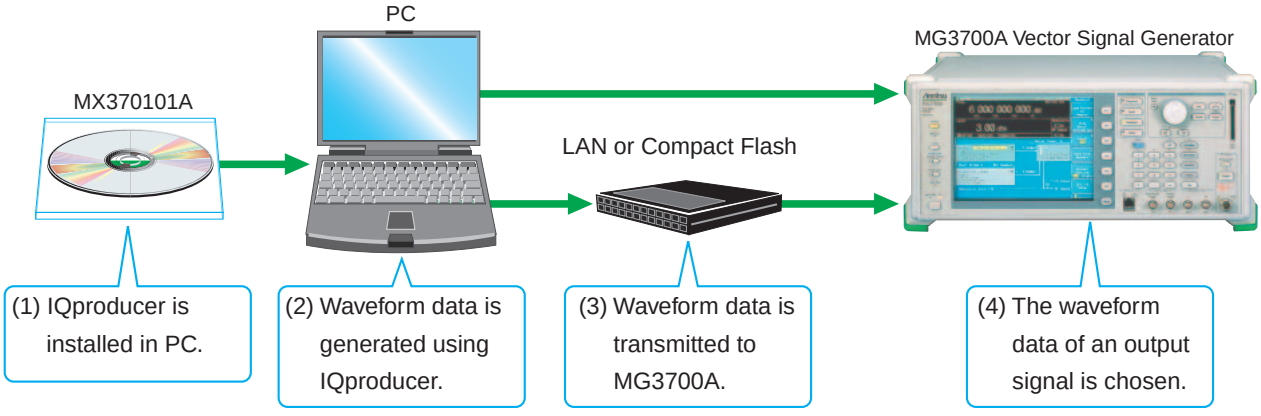
• IQproducer™ operating environment

CPU	Pentium Ⅲ 1 GHz or faster
Memory size	≥512 Mbytes
HDD	≥5 Gbytes
Display	1024 × 768 pixels or more
OS	Windows® 2000 Professional, Windows® XP

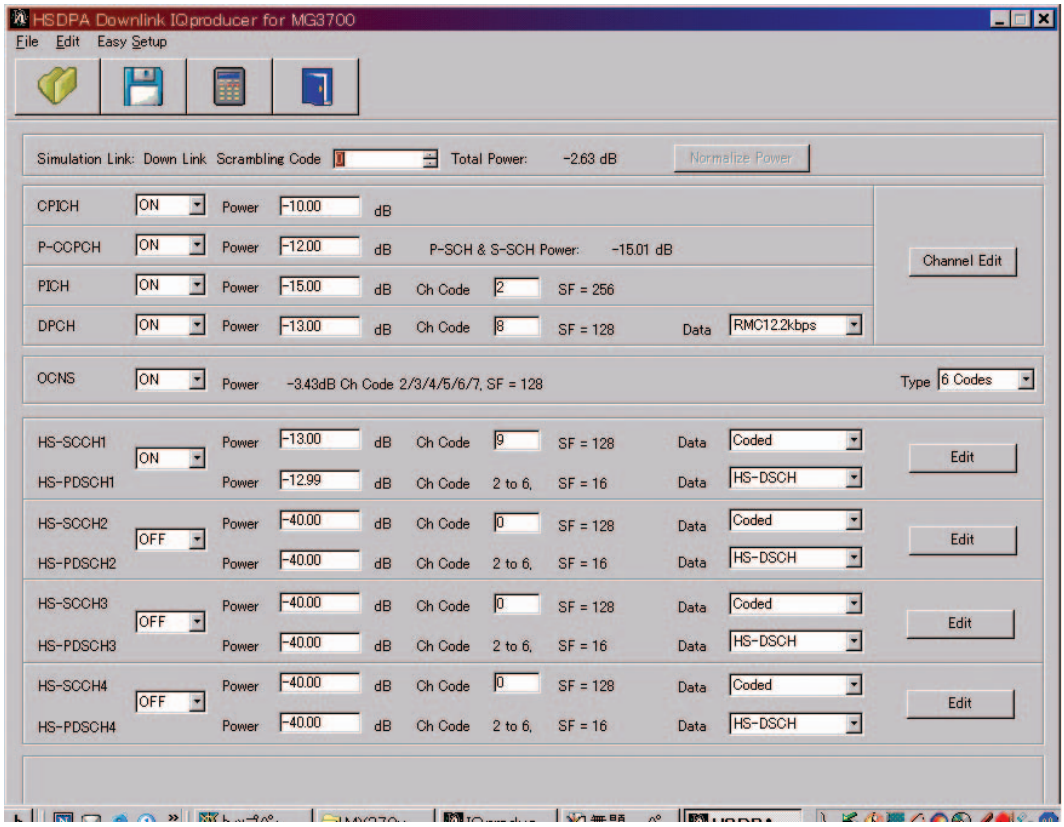
Windows/Windows2000/WindowsXP is a registered trademark of Microsoft Corporation.

• Downlink Settings:
Various parameters conforming to standards can be set for downlink (for details, refer to the “Downlink parameter setting range” table shown later).
The Downlink Easy Setup function provides the items for the HSDPA Fixed Reference Channel (FRC) specified in 3GPP TS25.101 and the Reference Measurement Channel (RMC) specified in 3GPP TS25.101, TS25.104. Parameter setting and waveform pattern generation can be performed simply by selecting items.
[Easy Setup items]
FRC: H-Set1 (QPSK), H-Set1 (16QAM), H-Set2 (QPSK), H-Set2 (16QAM), H-Set3 (QPSK), H-Set3 (16QAM), H-Set4, H-Set5
RMC: RMC12.2 kbps (for RX test), RMC12.2 kbps (for Performance test), RMC64 kbps (for Performance test), RMC144 kbps (for Performance test), RMC384kbps (for Performance test)

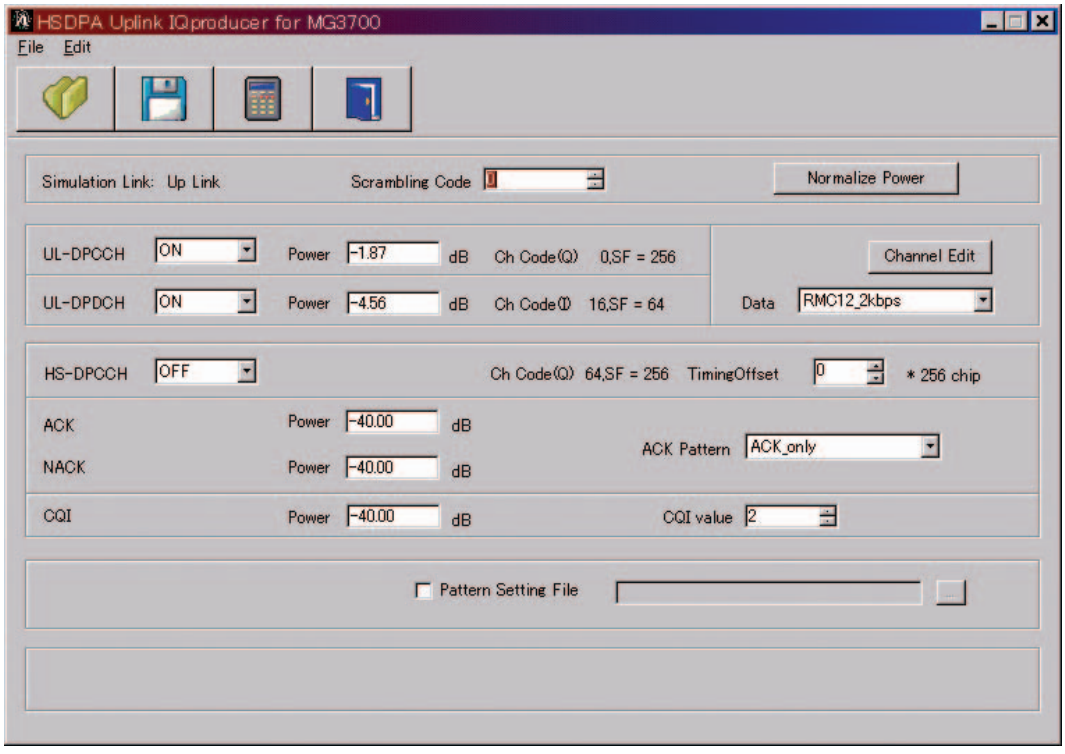
• Uplink Settings:
For Uplink, parameter setting for the UL-DPCCH/UL-DPDCH and HS-DPCCH channels and waveform pattern generation can be performed (for details, refer to the “Uplink parameter setting range” table shown later).
HS-DPCCH (ACK, NACK, CQI)
UL-DPCCH
UL-DPDCH



• Downlink Main screen:



• Uplink Main screen:



MX370101A HSDPA IQproducer

Optional

• Downlink parameter setting range:

Display	Setting range	
Scrambling Code		0 to 8191
CPICH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB], Resolution 0.01 dB
P-CCPCH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB], Resolution 0.01 dB
PICH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB], Resolution 0.01 dB
	Channelization Code	0 to 255
DPCH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB], Resolution 0.01 dB
	Channelization Code	0 to SF –1 The spreading factor (SF) varies depending on the [Data] setting as follows: RMC 12.2 kbps = 128 RMC 64 kbps = 32 RMC 144 kbps = 16 RMC 384 kbps = 8 AMR1/AMR2/AMR3 = 128 ISDN = 32384 kbps Packet = 8
	Data	RMC12.2 kbps / RMC 64 kbps / RMC 144 kbps / RMC 384 kbps / AMR1 / AMR2 / AMR3 / ISDN / 384 kbps Packet
OCNS	ON/OFF	ON or OFF
	Type	16 Codes or 6 Codes
HS-SCCH1/2/3/4	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB]
	Channelization Code	0 to 127
	Data	PN9/PN9fix/PN15fix/16bitRepeat/Coded
HS-PDSCH1/2/3/4	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 [dB]
	Channelization Code	0 to 127
	Data	PN9/PN9fix/PN15fix/16bitRepeat/HS-DSCH
P-CCPCH Edit	SFN Cycle	8 or 4096
DPCH Edit	DTCH Information Data	PN9/PN9fix/PN15fix/16bitRepeat
	TFCI	0 to 1023
HSDPA transport channel (HS-SCCH,HS-PDSCH parameters)	Channelization Code Offset	1 to (16 - "Number of Physical Channel Code")
	Number of Physical Channel Code	1 to (16 - "Channelization Code Offset")
	Modulation	QPSK or 16QAM
	Transport Block Size Information	0 to 63
	RV Information	0 to 7
	UE Identity	0 to 65535
	CRC Error Insertion	Correct or Fail (CRC error of all)
	Number of HARQ Processes	0 to 8
	Virtual IR Buffer Size	800 to 304000 (Resolution: 800)
	Payload Data	PN9/PN9fix/PN15fix/16bitRepeat
Transmitting Pattern Edit	HARQ Process Cycle	0 to 16 (Note that it ranges from 0 to 6 if PN9 has been set for Payload Data.)
	Inter-TTI Distance	1 to 8
	TTI Start Offset	0 to 7
	Process Setting File	Used or Not used

• Uplink parameter setting range:

Display	Setting range	
Scrambling Code		0 to 16777215
UL-DPCCH, UL-DPDCH	Channel ON/OFF	ON or OFF
	Power	0 to –40.00 dB
	Data	RMC 12.2 kbps / RMC 64 kbps / RMC 144 kbps / RMC 384 kbps / AMR1 / AMR2 / AMR3 / ISDN / 64 kbps Packet
HS-DPCCH	ON/OFF	HS-DPCCH ON or OFF
	Timing Offset	0 to 149
	ACK Power	0 to –40.00 dB
	NACK Power	0 to –40.00 dB
	CQI Power	0 to –40.00 dB
	ACK Pattern	ACK_only, NACK_only, alt_ACK_NACK_DTX
	CQI value	0 to 30
	Pattern Setting File	Used or Not used
DPCH Edit	DTCH Information Data	PN9/PN9fix/PN15fix/16 bit Repeat
	TFCI	0 to 1023

• Parameter save/recall:

The numeric values and settings for each item can be saved in a parameter file. Type the desired name in the [file name] text box and then click the [Save] button to save the parameter file.

A parameter file can be recalled. Click the desired parameter file from the file list and then click the [Open] button.

MX370102A TDMA IQproducer

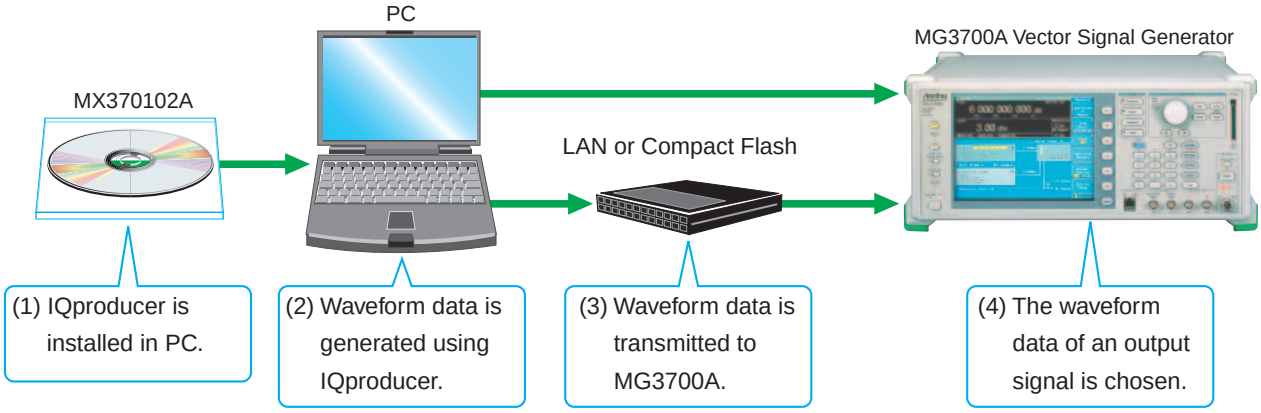
Optional

■ TDMA IQproducer:

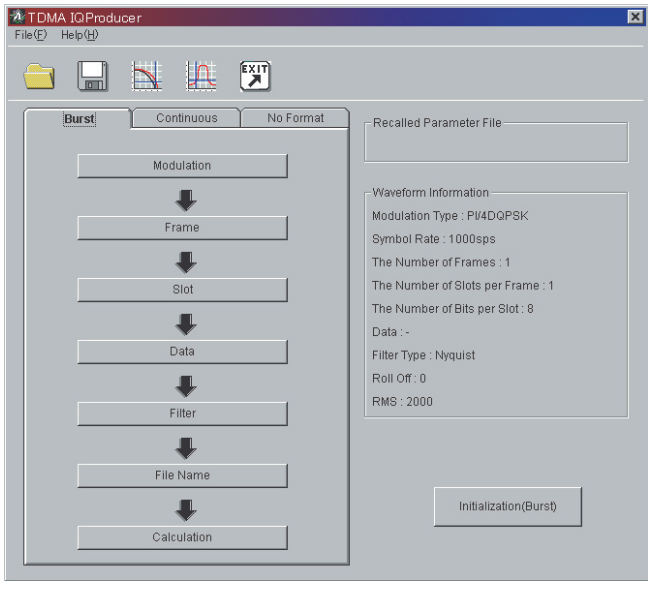
The MX370102A TDMA IQproducer“ is GUI-driven PC application software used to set up the parameters and generate waveform patterns according to the TDMA system. The generated waveform patterns are downloaded to the MG3700A, and used to output TDMA Modulation baseband signals and RF signals with the ARB generation function of the MG3700A.
In addition to the signals supporting the PDC, PHS, and ARIB STD-T61/T79/T86 systems, signals for other systems can also be generated.

• IQproducer™ operating environment

CPU	Pentium Ⅲ 1 GHz or faster
Memory size	≥512 Mbytes
HDD	≥5 Gbytes
Display	1024 × 768 pixels or more
OS	Windows® 2000 Professional, Windows® XP



• Main screen:



• Parameter setting items list:

Setting items	Parameter setting sheet		
	Burst	Continuous	No Format
Modulation	✓	✓	✓
Frame —		✓	✓
Slot	✓	✓	—
Field	✓	✓	—
Data	—	—	✓
Filter	✓	✓	✓
Pattern Name	✓	✓	✓

• Parameter setting items list:

Items	Display	Outline	Setting range
Modulation	Modulation Type	Modulation system	PI/4DQPSK, BPSK, QPSK, 8PSK, 16QAM, 16QAM (ARIB_STD_T86), 64QAM, 256QAM
	Symbol Rate	Symbol rate	1ksps to 40Msps (Specified in increments of 1 sps.)
Frame	The Number of Frames	Frame number	1 to 4088
	The Number of Slots per Frame	Slot numbers in one frame	1 to 10
Slot(Burst)	1, 24field	Guard field	Set the number of bits listed in the separate table according to “Modulation Type.”
	2, 23field	Ramp field	Set the number of bits listed in the separate table according to “Modulation Type.”
	3 to 22field	Fixed (Fixed data) field	Set an integer from 0 to 32.
	3 to 22field	DATA (PN9, PN15) field	Set an integer from 0 to 400.
	4 to 22field	CRC(Cyclic Redundancy Check character) field	Set an integer from 0 to 32.
Slot(Continuous)	1 to 24field	Fixed (Fixed data) field	Set an integer from 0 to 32.
	1 to 24field	DATA (PN9, PN15) field	Set an integer from 0 to 400.
	2 to 24field	CRC(Cyclic Redundancy Check character) field	Set an integer from 0 to 32.
Field (Burst/Continuous)	Fixed	Sets a hexadecimal fixed data.	0 to the maximum value of the number of bits being set
	CRC	Sets the CRC calculation field by an integer.	1 to the number of bits in the field on the left to CRC (except Guard and Ramp fields)
	Data Field	Selects a continuous pattern.	PN9, PN15, 16-bit Pattern, ALL0, ALL1 Enter arbitrary hexadecimal number for “16-bit Pattern.”
Data(No Format)	Data	Selects a continuous pattern.	PN9, PN15, 16-bit Pattern, ALL0, ALL1
Filter	Filter	Filter type	Root Nyquist, Nyquist
	Roll Off	Filter roll-off rate	0 to 1.00 (up to the second digit of fraction)
	RMS	RMS value of waveform pattern data	651 to 4104
Pattern Name	Pattern Name	Waveform pattern file name	Within 20 characters
	Comment	Comment	Within 38 characters
Calculation	Starts waveform pattern data generation after setting parameters.		

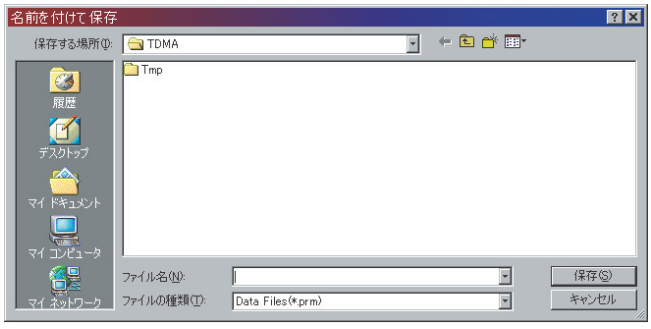
MX370102A TDMA IQproducer

Optional

• Ramp field Setting range:

Modulation Type	Bit numbers
Pi/4DQPSK, QPSK	Multiple of 2 from 2 to 32
BPSK	Integer from 1 to 32
8PSK	Multiple of 3 from 3 to 30
16QAM, 16QAM (ARIB_STD_T86)	Multiple of 4 from 4 to 32
64QAM	Multiple of 6 from 6 to 30
256QAM	Multiple of 8 from 8 to 32

• Parameter save/recall:



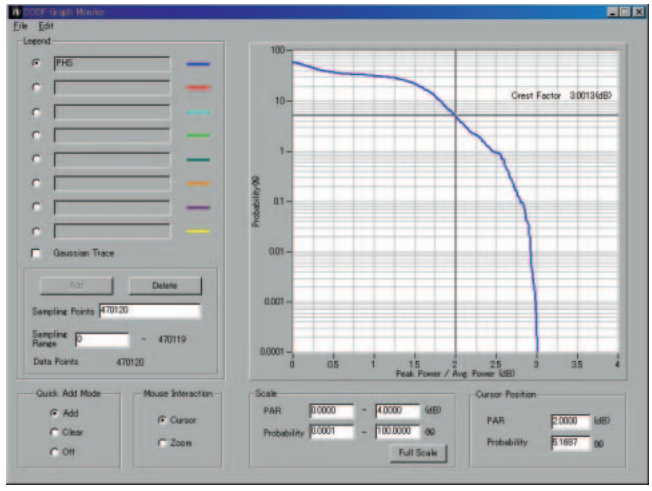
The numeric values and settings for each item can be saved in a parameter file. Type the desired name in the [file name] text box and then click the [Save] button to save the parameter file. A parameter file can be recalled. Click the desired parameter file from the file list and then click the [Open] button.

• Graph:

This function displays a generated waveform pattern in a CCDF or FFT graph on the PC. It is useful to check/review the waveform pattern in a graph before transferring it to the MG3700A.

[CCDF (Complimentary Cumulative Distribution Function) graph]

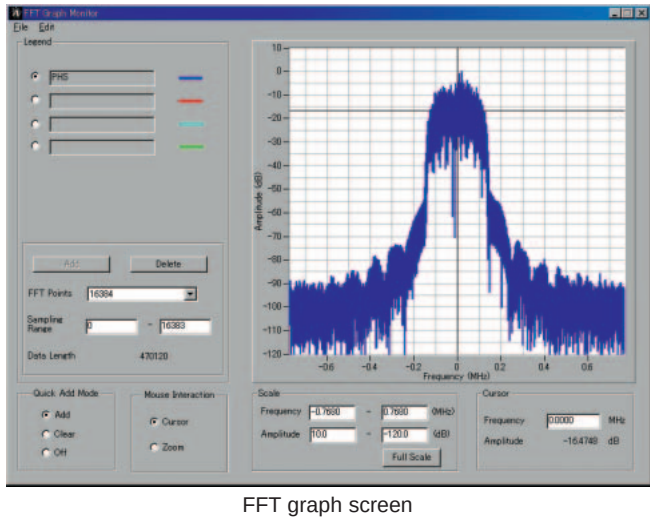
Up to eight types of generated waveform patterns are read to be displayed in a CCDF graph.



CCDF graph screen

[FFT (Fast Fourier Transform) graph]

Up to four types of generated waveform patterns are read and the FFT calculation results for them are displayed in an FFT graph.



FFT graph screen

MX370103A CDMA2000 1xEV-DO IQproducer

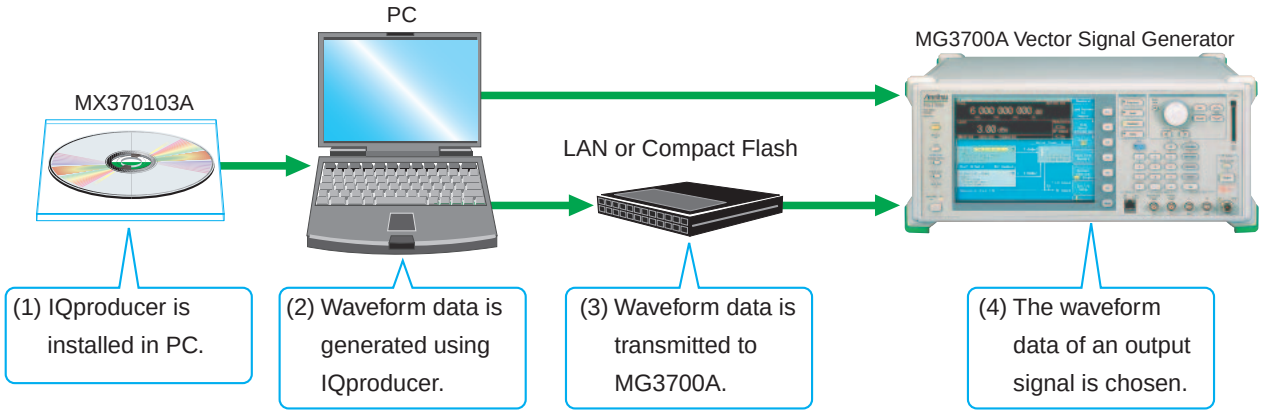
Optional

CDMA2000 1xEV-DO IQproducer:

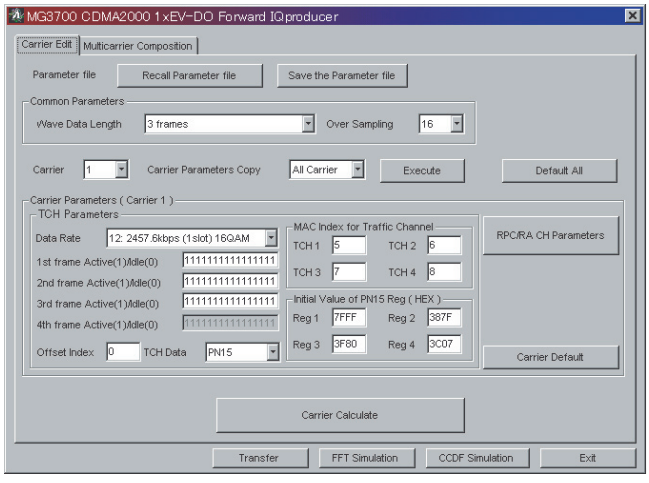
The MX370103A CDMA2000 1xEV-DO IQproducer is GUI-driven PC application software used to set up the parameters and generate waveform patterns according to the CDMA2000 1xEV-DO system (1xEV-DO forward and 1xEV-DO Reverse). The generated waveform patterns are downloaded to the MG3700A, and used to output CDMA2000 1xEV-DO Modulation baseband signals and RF signals with the ARB generation function of the MG3700A.
For forward, multi-carrier signals of up to nine carriers and mixed signals of Idle and Active can be generated. For reverse, multi-user signals for which the frequency, phase, level, and delay are adjusted freely can be generated.

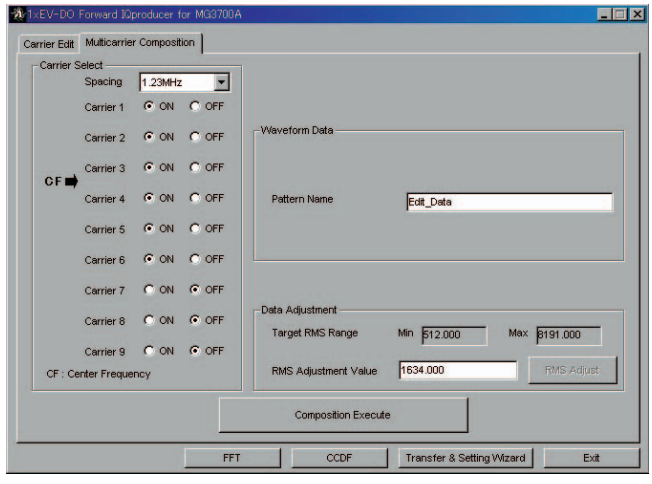
• IQproducer™ operating environment

CPU	Pentium Ⅲ 1 GHz or faster
Memory size	≥512 Mbytes
HDD	≥5 Gbytes
Display	1024 × 768 pixels or more
OS	Windows2000® Professional, Windows XP



• 1xEV-DO forward setting screen





Optional

• 1xEV-DO forward setting range

[Carrier Edit sheet]

On the Carrier Edit sheet, set up the Modulation parameters for the single carriers (associated with carrier numbers 1 to 9) that constitute the multi-carrier.

Display	Setting range
Wave Data Length ing	Number of frames of the waveform pattern to be generated. Specify up to 4 frames. Specify 3 frames when generat- a multi-carrier.
Over Sampling	Over sampling rate for waveform patterns. Set 4, 8, or 16.
Default All	Restores the settings of all the single carriers to the initial values.
Carrier	Select a single carrier to be edited from 1 to 9.
Carrier Parameters Copy	Specify a single carrier to which the settings of the currently-set single carrier are to be copied (copy destination). Set Carrier 1 to Carrier 9 or All Carrier.
Execute	Copies the settings of the currently-set single carrier (the corresponding carrier number is displayed in Carrier) to the copy destination specified by Carrier Parameters Copy. The settings to be copied include the contents of the RPC/RA CH Parameter screen.
Data Rate	Set the data rate and transmission slot for the single carrier to be generated from the following:38.4 kbps (16 slots) QPSK, 76.8 kbps (8 slots) QPSK, 153.6 kbps (4 slots) QPSK, 307.2 kbps (2 slots) QPSK, 614.4 kbps (1 slot) QPSK, 307.2 kbps (4 slots) QPSK, 614.4 kbps (2 slots) QPSK, 1228.8 kbps (1 slot) QPSK, 921.6 kbps (2 slots) 8-PSK, 1843.2 kbps (1 slot) 8-PSK, 1228.8 kbps (2 slots) 16QAM, 2457.6 kbps (1 slot) 16QAM, Idle Slot
1st to 4th Frame Active (1) / Idle (0)	Set traffic channel active/idle for each slot.
TCH Data	Set the traffic channel payload data. All '0': Sets the payload data to all 0. All '1': Sets the payload data to all 1. PN15: Sets the payload data to a discontinuous PN15 sequence. PN15 is continuous within a frame.
Offset Index	Specify the PN Offset Index of the single carrier to be generated from 0 to 511.
TCH1 to TCH4	Specify the MAC Index that is used for the scrambling sequence of the traffic channel and preamble Walsh cover by an integer from 5 to 63.
Reg1 to Reg4	Initial value of the linear feedback shift register used to generate the PN15 sequence when TCH Data is set to PN15. Set a hexadecimal number from 0 to 7FFF. The offset can be added to the PN15 sequence of each TCH by changing this initial value.
Carrier Default	Restores the settings of the single carrier currently set on the screen (the corresponding carrier number is displayed in Carrier) to the initial values. The settings in the Carrier Parameters frame are restored to the initial values of the single carrier.
RPC/RA CH Parameters	Opens the RPC/RA CH Parameters screen used to set up the parameters of the RPC and RA channels.
	Generates the waveform patterns of nine single carriers with the current settings. After clicking this button, the entire

• RPC/RA CH Parameters sheet:

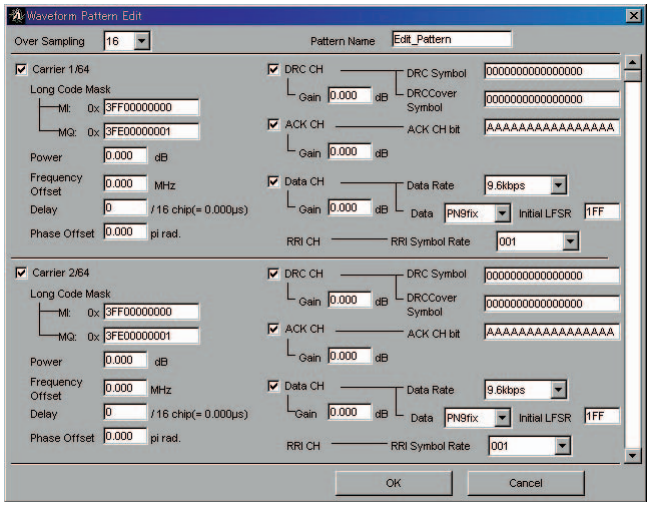
Display	Setting range
Frame	Selects a frame for which the RPC and RA channels are to be edited.
Slot	Selects a slot for which the RPC and RA channels are to be edited.
RA Bit	RA bit of RA channel. Set 0 or 1.
CH Power	Channel gain of MAC channel (relative value to pilot channel). Set from –40 to +40 dB.
RPC Bit	RPC bit of RPC channel. Set 0 or 1.
ON/OFF	Turns on/off each MAC channel.
Normalize	Sets the channel gains of the RPC and RA channels in the currently-set slot collectively to the ratio expressed with a fraction. The numerator of the RA channel ratio can be set from 1 to "denominator –1". The denominator can be set from 2 to 99.

[Multi-carrier Composition sheet]

Generates a multi-carrier or single carrier waveform pattern from the single carrier waveform patterns generated in the Carrier Edit

Display	Setting range
Spacing	Sets the frequency interval between the carriers having the consecutive carrier numbers, from 1.20, 1.23, or 1.25 MHz.
Carrier Select	Turns on or off the single carrier that is used to generate a multi-carrier (or a single carrier, if only one single carrier were turned with all the others turned off) in the single carrier generated in the Carrier Edit sheet.
Target RMS Range	"RMS" indicates the waveform pattern RMS value. Set the maximum value to "Max" when adjusting the waveform pattern RMS value.
RMS Adjustment Value	Sets the RMS value of the multi- or single carrier waveform pattern.
RMS Adjust	Converts a waveform pattern generated by clicking the Composition Execute button into a waveform pattern that has an RMS value close to the value entered in RMS Adjustment Value.

• 1xEV-DO Reverse Setting range:



Display	Description	Setting range
Over Sampling	Ratio of the waveform pattern sampling rate and the chip rate	4, 8, 16
Carrier On/Off	Set the carrier On/Off. It is “On” when checked.	On, Off
Long Code Mask	Set the I and Q long code masks. MQ is set automatically when MI is set by a user.	MI, MQ: 0x0 to 0x3FFFFFFFFF
Power	Set the power of carrier.	–80.000 to 0.000 dB
Frequency Offset	Set the carrier frequency offset from the center frequency setting of the MG3700A.	–5.000 to 5.000MHz
Delay	Set the delay of the carrier. A delay is a time gap from when a frame trigger is output from the rear panel of the MG3700A to when the first frame of the carrier is output.	0 chip to 32768 chip
Phase Offset	Set a phase offset of the carrier.	0.000 to 2.000 pai rad.
DRC CH On/Off	Set the DRC channel On/Off. It is “On” when checked.	On, Off
DRC CH Gain	Set the channel gain of the DRC channel by a relative value to the pilot channel.	–80.000 to 20.000 dB
DRC Symbol	Set the DRC channel symbol data in hexadecimal.	0000000000000000 to FFFFFFFFFFFFFFFF(HEX)
DRC Cover Symbol	Set the DRC cover symbol data in octal.	0000000000000000 to 7777777777777777(OCT)
ACK CH On/Off	Set the ACK channel On/Off. It is “On” when checked.	On, Off
ACK CH Gain	Set the channel gain of the ACK channel by a relative value to the pilot channel.	–80.000 to 20.000 dB
ACK CH Bit	Set the ACK channel bit.	A (ACK), N (NACK), X (DTX)
Data CH On/Off	Set the Data channel On/Off. It is “On” when checked.	On, Off
Data CH Gain	Set the channel gain of the Data channel by a relative value to the pilot channel.	–80.000 to 20.000 dB
Data Rate	Set the Data channel data rate.	9.6, 19.2, 38.4, 76.8, 153.6 kbps
Data	Set the Data channel payload data. The selection item “PN9fix” specifies a discontinuous PN9 code sequence.	PN9fix, All '0', All '1'
Initial LFSR	When PN9fix is set for Data, set the initial value of the PN9 generation shift register in hexadecimal.	0 to 1FF (HEX)
RRI Symbol	Set the RRI symbol in binary.	000 to 101 (BIN)

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Optional

■ Parameter save/recall:

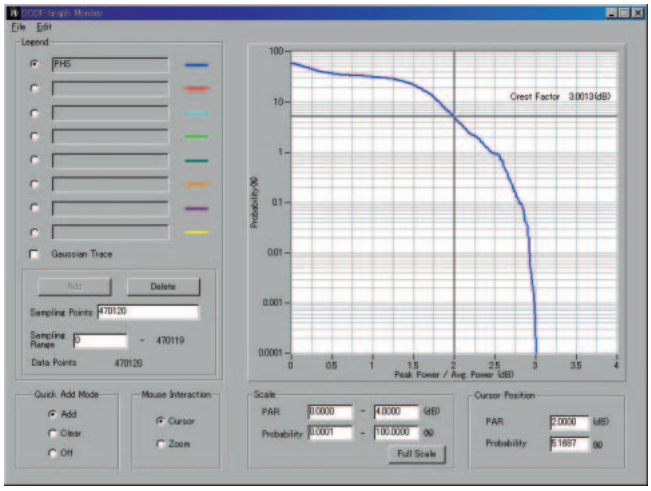
The numeric values and settings for each item can be saved in a parameter file. Type the desired name in the [file name] text box and then click the [Save] button to save the parameter file. A parameter file can be recalled. Click the desired parameter file from the file list and then click the [Open] button.

■ Graph:

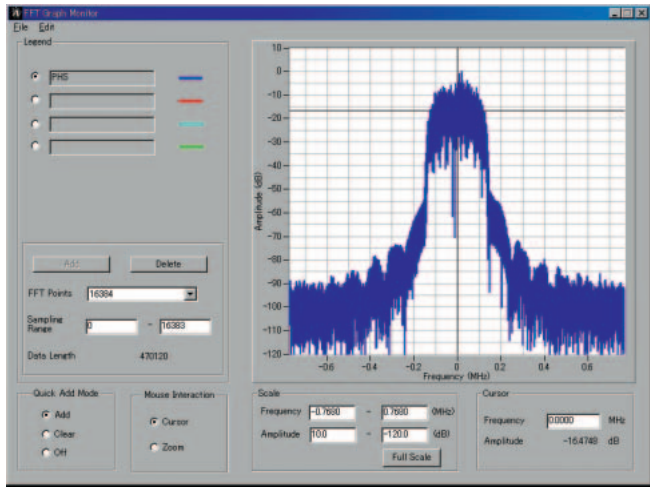
This function displays a generated waveform pattern in a CCDF or FFT graph on the PC. It is useful to check/review the waveform pattern in a graph before transferring it to the MG3700A.

[CCDF (Complimentary Cumulative Distribution Function) graph]
Up to eight types of generated waveform patterns are read to be displayed in a CCDF graph.

[FFT (Fast Fourier Transform) graph]
Up to four types of generated waveform patterns are read and the FFT calculation results for them are displayed in an FFT graph.



CCDF graph screen



FFT graph screen

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name	Remarks
	— Mainframe —	
MG3700A	Vector Signal Generator	
	— Standard accessories —	
J0017F	Power cord, 2.6 m : 1 pc	
J1276	LAN Straight cable : 1 pc	10 cm, For U link connection on Rear panel
P0020	Compact Flash 64 MB : 1 pc	
J1254	Compact Flash Adapter : 1 pc	
Z0742	MG3700A CD-ROM : 1 pc	Main frame operation manual, IQproducer operation manual, Standard waveform operation manual, IQproducer software
	— Options —	
MG3700A-001	Rubidium Reference Oscillator	Aging rate: +/–1 × 10^{-10}/Month
MG3700A-002	Mechanical Attenuator	Standard Electron Attenuator is changed to Mechanical Attenuator.
MG3700A-011	Upper Frequency 6 GHz	Standard “250 kHz to 3 GHz” is extended to “250 kHz to 6 GHz.”
MG3700A-021	ARB Memory Upgrade 512 M sample	Standard “128 Msample/channel × 2” is extended to “256 Msample/channel × 2.”
MG3700A-101	Rubidium Reference Oscillator Retrofit	Retrofitted to an already-shipped mainframe.
MG3700A-102	Mechanical Attenuator Retrofit	Retrofitted to an already-shipped mainframe.
MG3700A-103	Electronic Attenuator Retrofit	Retrofitted to an already-shipped mainframe.
MG3700A-111	Upper Frequency 6GHz Retrofit	Retrofitted to an already-shipped mainframe.
MG3700A-121	ARB Memory Upgrade 512 M sample Retrofit	Retrofit Retrofitted to an already-shipped mainframe.
	— Maintenance service —	
MG3700A-ES210	Extended warranty service	Two years
MG3700A-ES310	Extended warranty service	Three years
MG3700A-ES510	Extended warranty service	Five years
	— Softwares (Waveform pattern) —	
MX370001A	TD-SCDMA Waveform Pattern	
MX370002A	Public Radio System Waveform Pattern	RCR STD-39, ARIB STD-T61/T79/T86
	— Softwares (License Key for IQproducer system) —	
MX370101A	HSDPA IQproducer	
MX370102A	TDMA IQproducer	
MX370103A	CDMA2000 1xEV-DO IQproducer	
	— Optional accessories —	
W2495AE	MG3700A operation manual	
W2496AE	MG3700A IQproducer operation manual	
W2539AE	MG3700A standard waveform pattern operation manual	
W2503AE	MX370101A HSDPA IQproducer operation manual	
W2504AE	MX370102A TDMA IQproducer operation manual	
W2505AE	MX370103A CDMA2000 1xEV-DO IQproducer operation manual	
G0141	HDD ASSY	For Embedded HDD Exchange
K240B	Power Divider (K connector)	DC to 26.5 GHz, K-J, 50 Ω, 1 Wmax
MA1612A	Four-Port Junction pad	5 MHz to 3 GHz, N-J
MP752A	Termination	DC to 12.4 GHz, 50 Ω, N-P
MA2512A	Band Pass Filter	For W-CDMA, pass band: 1.92 to 2.17 GHz
J0576B	Coaxial Cord, 1.0 M	N-P・5D-2W・N-P
J0576D	Coaxial Cord, 2.0 M	N-P・5D-2W・N-P
J0127C	Coaxial Cord, 0.5 M	BNC-P・RG-58A/U・BNC-P
J0127B	Coaxial Cord, 2.0 M	BNC-P・RG-58A/U・BNC-P
J0127A	Coaxial Cord, 1.0 M	BNC-P・RG-58A/U・BNC-P
J0322A	Coaxial Cord, 0.5 M	SMA-P・SMA-P, DC to 18 GHz, 50 Ω
J0322B	Coaxial Cord, 1.0 M	SMA-P・SMA-P, DC to 18 GHz, 50 Ω
J0322C	Coaxial Cord, 1.5 M	SMA-P・SMA-P, DC to 18 GHz, 50 Ω
J0322D	Coaxial Cord, 2.0 M	SMA-P・SMA-P, DC to 18 GHz, 50 Ω
J1264	N-SMA Adapter	N-P・SMA-J
J1261B	Ethernet Cable (Shield Type)	Straight, 3 m
J1261D	Ethernet Cable (Shield Type)	Cross, 3 m
J0008	GPIB CABLE, 2.0 M	
J1277	IQ Output Conversion Adapter	D-SUB/BNC
B0329C	Front cover for 1MW 4	
B0331C	Front panel handle kit	2 pcs/set
B0332	Joint plate	4 pcs/set
B0333C	Rack mount kit	
B0334C	Hardtype carrying case	With front cover and casters
P0021	Compact Flash 128 MB	
P0022	Compact Flash 256 MB	
P0023	Compact Flash 512 MB	

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Specifications are subject to change without notice.

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